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**PEDIATRIC OBESITY:  
WHAT DO WE KNOW?  
WHAT CAN WE DO?**

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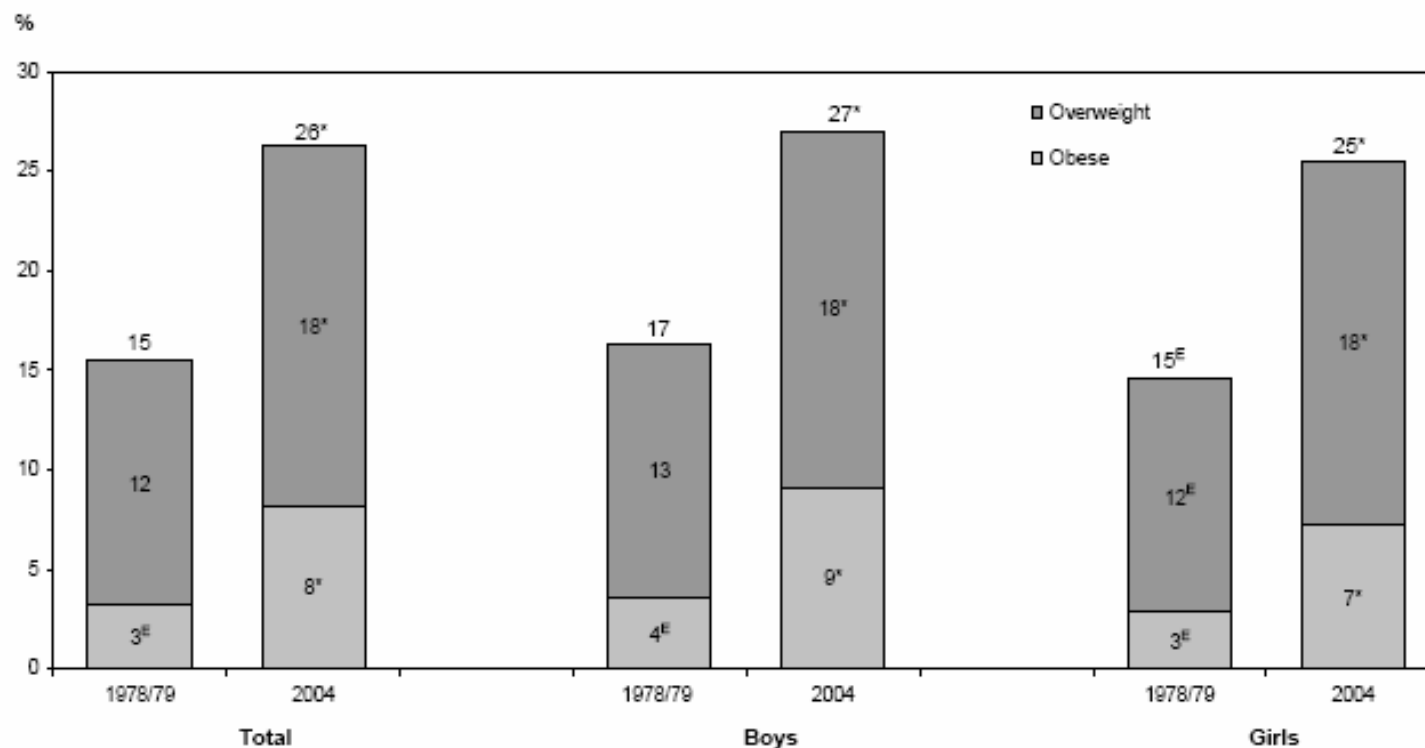
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## **FACTS**

- **Over the past 3 decades obesity and overweight have increased dramatically among children and adolescents in Canada. This increase cannot be explained by genetic changes. Unhealthy environment had and still has a major role.**
- **However, everybody is not equal in front of excess weight gain associated with unhealthy environment.**
- **Overweight/obesity is not a benign finding. Numerous studies document association between excess adiposity and dyslipidemia, hyperinsulinemia, elevated CRP, high BP and clustering of these risk factors.**

# Overweight and obesity rates, by sex, population aged 2 to 17, 1978/79 and 2004

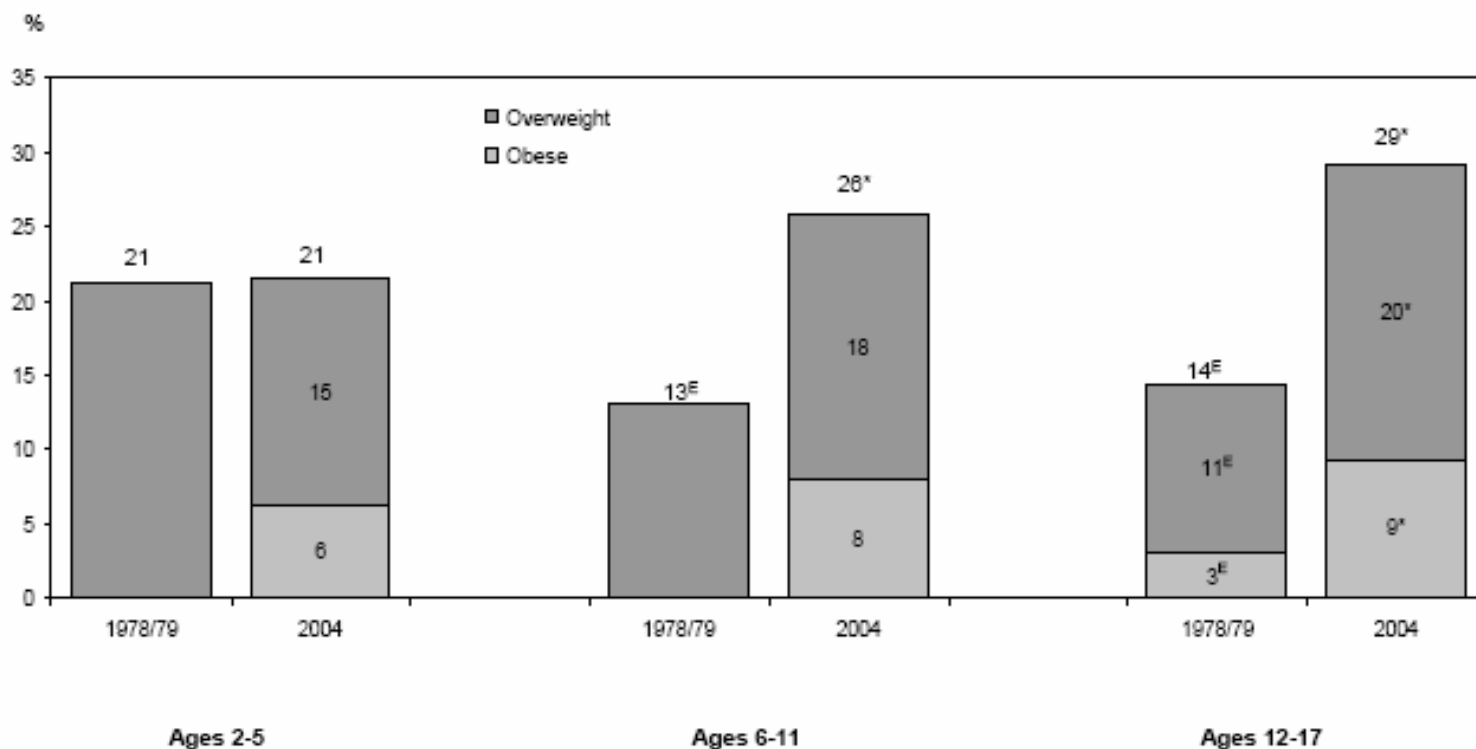


Data sources: 2004 Canadian Community Health Survey: Nutrition; Canada Health Survey 1978/79

\* Significantly different from estimate for 1978/79 ( $p < 0.05$ )

E Coefficient of variation between 16.6% and 33.3% (interpret with caution)

# Overweight and obesity rates, by age group, population aged 2 to 17, 1978/79 and 2004



Data sources: 2004 Canadian Community Health Survey: Nutrition; Canada Health Survey 1978/79

Note: The obesity rates for the 2-5 and 6-11 age groups from the 1978/79 Canada Health Survey have coefficients of variation greater than 33.3%; therefore, the estimates are not releasable.

E Coefficient of variation between 16.6% and 33.3% (interpret with caution)

\* Significantly different from estimate for 1978/79 ( $p < 0.05$ )

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## **UNHEALTHY ENVIRONMENT AND PERCEPTION**

- **Sedentary lifestyle behaviors, physical inactivity and poor nutrition must be modified to successfully prevent obesity in children and youth.**
  - **So far most interventions aimed at modifying lifestyle behaviors have had limited success and changes were not sustained long-term.**
  - **Key to behavior change is recognizing a problem exists.**
  - **Accurately perceiving oneself as overweight is a cue for change.**
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**To what extent does  
children and youth's perceived body weight  
correspond with  
objective weight measures?**

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## **THE QUEBEC CHILD AND ADOLESCENTS HEALTH AND SOCIAL SURVEY (QCAHS 1999)**

- **Children and adolescents aged 9, 13, 16 years, attending public or private, elementary or high schools.**
  - **Multistage cluster sampling; 3 independent samples.**
  - **Sampling frame: 98% of target population.**
  - **Questionnaires, anthropometric measures, BP: 1736 boys, 1799 girls.**
  - **Blood draw: 1192 boys, 1254 girls.**
  - **Conducted between January and May 1999.**
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# SELF-PERCEIVED WEIGHT STATUS

- Self report on Stunkard Body Rating Scale (Collins, 1991).
- 7 sex-specific silhouettes from underweight to obese for girls and boys.
- Participants selected the figure they perceived best corresponded to their actual appearance.

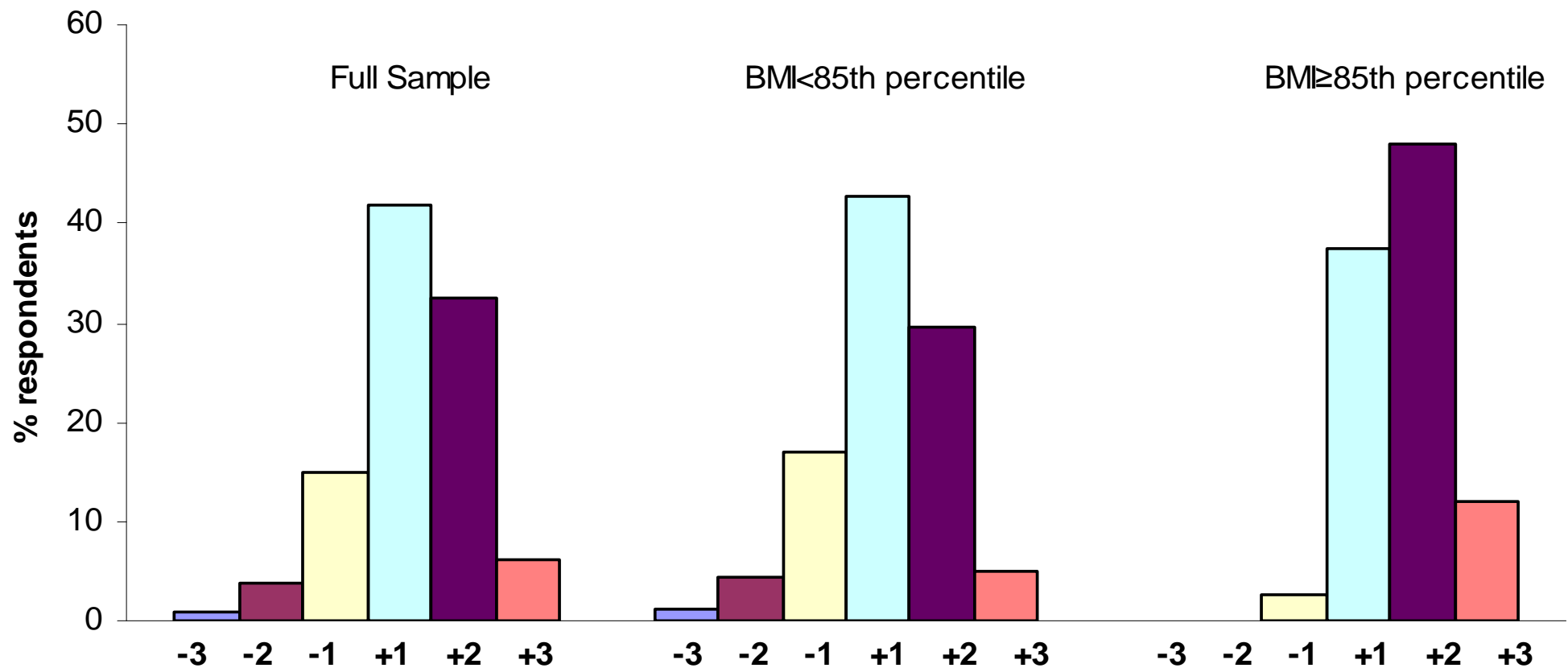


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# MISPERCEPTION SCORE

- BMI (from measured height and weight) transformed to Z scores.
  - Self-perceived weight assigned Z-values.
  - Misperception score calculated as the standardized difference between actual BMI and self-perception of weight status.
  - A greater score indicated a greater positive difference between actual BMI and perceived weight status.
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# DISTRIBUTION of WEIGHT MISPERCEPTION by BMI



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# **INFLUENCE OF PARENT AND SCHOOLMATE BMI ON SELF-PERCEIVED BODY WEIGHT**

- **Greater parent and schoolmate BMI associated with greater misperception.**
  - **School peers most influential in how students perceive their own weight.**
  - **Younger children particularly vulnerable to the influence of parent and schoolmate BMI.**
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## WHAT CAN WE DO?

- Growth charts are widely and easily accessible (<http://www.cdc.gov/growthcharts/> ).
  - Nurses, dietitians, family physicians, pediatricians can share with family their conclusions regarding weight status and allow them to follow it.
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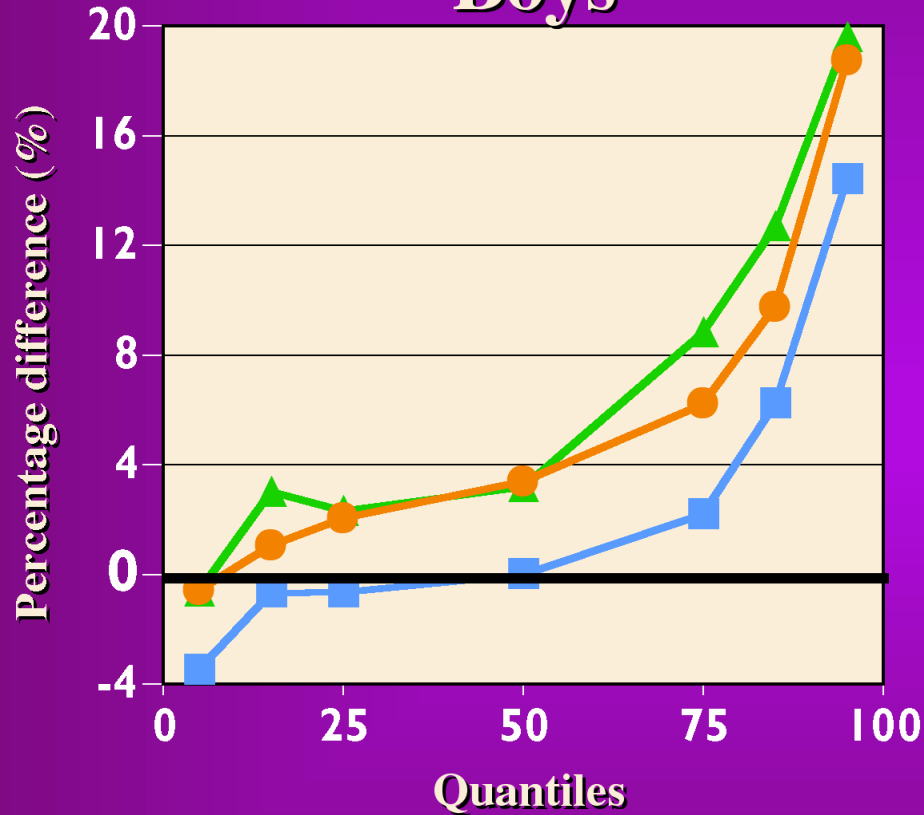
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# EVERYBODY IS NOT EQUAL

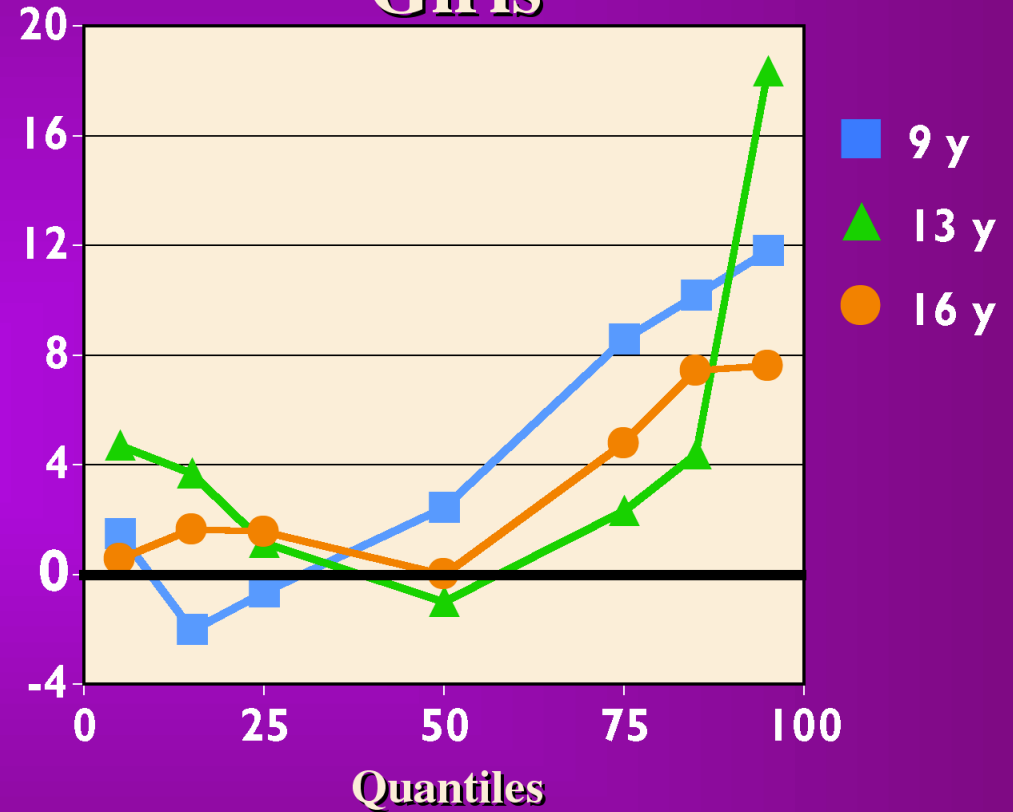
- **Increase in the BMI does not affect evenly the entire distribution.**
  - **Disproportionate increase in the higher percentiles.**
  - **Heavier individuals are becoming heavier than before while the lighter individuals show little change.**
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# Percentage (%) difference in BMI quantile values between QCAHS (1999) and CFS (1981)

Boys



Girls



$$\text{Percentage difference} = \frac{\text{QCAHS (1999) Value} - \text{CFS (1981) Value}}{\text{CFS (1981) Value}} \times 100$$

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# **METABOLIC AND VASCULAR CONSEQUENCES OF EXCESS WEIGHT**

- **Overweight/obesity is not a benign finding.**
  - **Surprisingly, there are few data on the prevalence of cardiometabolic risk factors in population-based samples of children and adolescents stratified by weight status.**
  - **Moreover, the risk factors assessed and the cut points used to define higher risk differ substantially across studies.**
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## WHAT CAN WE DO?

- **Standardise measurements and reach consensus on threshold values to define cardiometabolic risk factors across pediatric hospitals in Canada.**
  - **Will allow comparisons between studies, monitoring of trend and is a first step in harmonization of practices.**
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# **METABOLIC AND VASCULAR CONSEQUENCES OF EXCESS WEIGHT**

- We used 3 categories : acceptable, borderline and high.
- HDL-C and TG : AAP/AHA recommendations.
- ApoB and insulin : reference population, QCAHS
  - Acceptable, < 75<sup>th</sup> percentile;
  - Borderline, 75<sup>th</sup> – 95<sup>th</sup> percentile;
  - High, ≥ 95<sup>th</sup> percentile.
- Fasting glucose : ADA recommendations.
- CRP : AHA / CDC recommendations.
- BP : NHBPEP recommendations.

# THRESHOLDS USED TO CATEGORIZE RISK FACTORS

Risk factor	Category		
	Acceptable	Borderline	Unfavourable
ApoB (g/L)	< 0,75	0,75 to < 1,0	≥ 1,0
HDL-C (mmol/L)	≥ 1,0	0,9 to < 1,0	< 0,90
TG (mmol/L)	< 1,7	1,7 to 2,3	≥ 2,3
Insulin (pmol/L)			
- 9-year-old	< 38	38 to < 60	≥ 60
- 13-16-year-old	< 60	60 to < 100	≥ 100
Fasting glucose (mmol/L)	< 5,6	5,6 to < 6,1	≥ 6,1
CRP (mg/L)	< 3,0	NA	≥ 3,0

**NUMBER OF CVD RISK FACTORS (UNFAVOURABLE)\*  
PER MALE PARTICIPANTS  
BY BMI CATEGORY (QCAHS 1999)**

Number of risk factors	BMI category		
	NW (n=830)	OW (n=141)	Obese (n=105)
	%		
0	78,3	58,2	34,2
1	18,0	33,6	35,6
2 or more	3,7	8,2	30,2

\*, ApoB, HDL-C, TG, insulin, fasting glucose, CRP, SBP.

**NUMBER OF CVD RISK FACTORS (UNFAVOURABLE)\*  
PER FEMALE PARTICIPANTS  
BY BMI CATEGORY (QCAHS 1999)**

Number of risk factors	BMI category		
	NW (n=900)	OW (n=156)	Obese (n=90)
	%		
0	78,0	56,9	33,9
1	19,5	28,9	34,0
2 or more	2,5	14,2	32,1

\*, ApoB, HDL-C, TG, insulin, fasting glucose, CRP, SBP.

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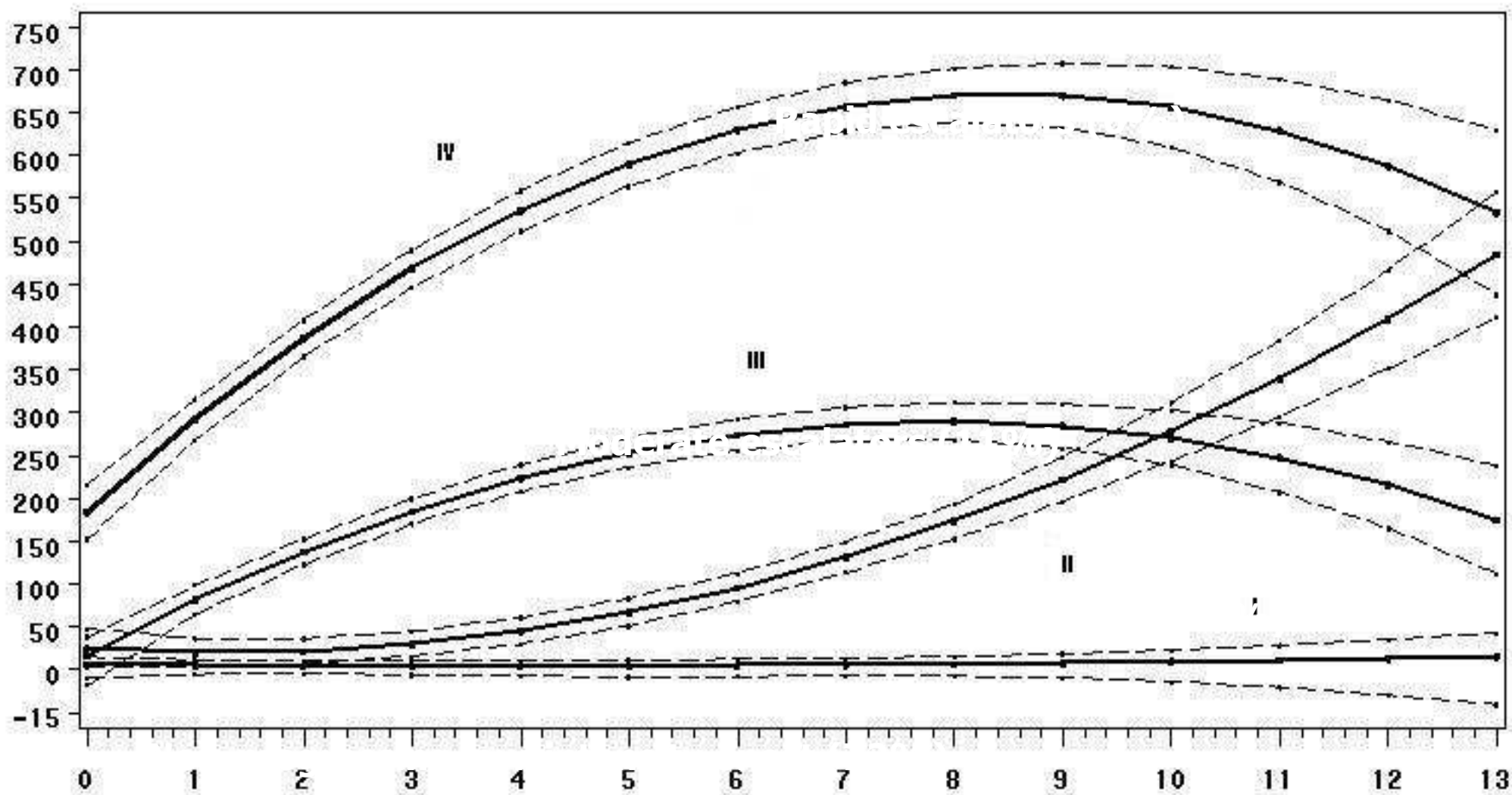
## WHAT DO WE KNOW?

- **As recommended by CPS and AAP, our data support the use of BMI-for-age as an effective screening tool for identifying children at risk for adverse levels of lipids, insulin, CRP and systolic BP.**
  - **There is marked population heterogeneity in the association between excess weight and cardiometabolic risk factors.**
  - **Identification of youth with excess weight should be viewed as an indication for further assessment of associated cardiometabolic risk factors rather than a final diagnosis in itself.**
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# KNOWLEDGE GAPS

- **What are the protective factors?**
  - **What are the trajectories of these cardiometabolic risk factors?**
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## WHAT CAN WE DO?

- **Training.**
  - **Continuing professional education.**
  - **Dissemination of Canadian guidelines.**
  - **Study of 1216 children (mean age: 7,9 years) from 13 pediatric practices (US):**
    - **248 with obesity, 28%** had been identified as such in the record;
    - **186 with overweight, 5%** had been identified as such in the record (*Pediatrics* 2007;119:e148).
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# **IMPAIRED FASTING GLUCOSE AND DIABETES (1)**

- **In 2003, the ADA changed the categorization of IFG from greater than 6.1 mmol/L to greater than 5.6 mmol/L. Remains a controversial decision.**
- **Fasting glucose 6,1 to < 7,0 mmol/L:**
  - **QCAHS: 2,1% in boys and 1,1% in girls;**
  - **NHANES III: 1,8%, both sexes;**
  - **Princeton School District Study: 2,0%, both sexes;**
  - **Ankara Adolescent Obesity and DM2 Study: 2,2% in boys and 1,8% in girls.**
- **In the QCAHS, prevalence of IFG similar across BMI categories.**

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## **IMPAIRED FASTING GLUCOSE AND DIABETES (2)**

- **Fasting glucose 5,6 to < 7,0 mmol/L:**
    - **QCAHS: 18,2% in boys and 9,7% in girls;**
    - **NHANES 1999-2002: 14,8% in boys and 7,3% in girls.**
  - **The sex difference in the prevalence of impaired fasting glucose was not explained by a difference in the prevalence of overweight/obesity between sexes.**
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# IMPAIRED FASTING GLUCOSE AND DIABETES (3)

- Prevalence of self-reported diabetes (all types) :
  - QCAHS : 0,5%;
  - NHANES III : 0,41%;
  - NHANES 1999-2002 : 0,5%;
  - Princeton School District Study : 0,41%.
- Undiagnosed fasting glucose  $> 7.0$  mmol/L :
  - QCAHS : no case (0/2475);
  - NHANES III : 2 cases (2/2867);
  - Princeton School District Study, 1 case (1/2501);
  - Ankara Adolescent Obesity and DM2 Study, no case (0/1647).

## WHAT DO WE KNOW

- **Type 2 diabetes is still an uncommon finding in youth of European descent.**
- **Undiagnosed fasting glucose  $> 7.0$  mmol/L is also uncommon in pediatric populations of European descent in contrast to reports in adults.**
- **However, considering the marked increase in the prevalence of overweight and obesity in youth, the tracking of BMI from childhood to adulthood and the fact that excess weight is the most important risk factor for type 2 diabetes, several adolescents are at risk for the development of diabetes as young adults.**

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## WHAT CAN WE DO?

- **There is still time for prevention.**
  - **Important knowledge gaps:**
    - **The basic biological characteristics of appetite and weight control remain elusive;**
    - **An increased understanding of the relative importance of genetic, biological, environmental and psychosocial determinants of overweight and its consequences is needed;**
    - **Research evidence base upon which to guide clinical decision-making for prevention of obesity and its co-morbidities and for weight management interventions is limited.**
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## **WHAT CAN WE DO?**

- **To meet these challenges, we need to foster dialogue and coordination between our Pediatric Departments.**
  - **We want to create an environment of innovation, research efficiency, and effective application of new discoveries to policy and practice.**
  - **The Maternal, Infant, Child and Youth Research Network (MICYRN).**
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**MERCI!**

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