# Exploring interactions among clustered components of Metabolic Syndrome with diabetes in The Study of Cardiovascular Risk Factors in Adolescents - ERICA Study

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regression model.

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(n=861)

P-value=0.02

(n=2.061)

(n=2,311)

5 High blood pressure: >130/85mmHg

### **BACKGROUND**

- Whether Metabolic syndrome (MetS) components interact with regard to diabetes mellitus or cardiovascular disease is controversial<sup>1,2</sup>.
- Aim: Assessment of interactions of metabolic syndrome components with regard to diabetes in adolescents.

## **METHODS**

- 2013-2014 population-wide school-based survey of 37,815 Brazilian adolescents aged 12 to 17 years from whom blood samples were collected<sup>3,4</sup>:
- MetS components (International Diabetes Federation)<sup>5</sup>: see table 1:
- Diabetes: self-reported diabetes or medications (pills), glucose≥126md/dL
- or HbA1C ≥6.5%. Exclusion: insulin use; 6 possible joint associations of three or more components. The glucose
- component was excluded: We estimated unadjusted and sex-, age-, body mass index (BMI)- and socioeconomic status-adjusted prevalence ratios (PR) using the Poisson
- Approach: Assessment of homogeneity of associations and comparison between observed and expected Joint associations.

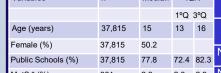
### **RESULTS**

- Median age: 15 years. Less than 3% of adolescents met the MetS criteria, 4% had diabetes and the majority was diagnosed by self-reported diabetes (table 1).
  - PRs of high TG in the presence vs absence of low HDL (4.53 vs 1.23), and elevated WC in the presence vs absence of high TG (3.23 vs 0.73) were heterogeneous, suggesting qualitative interactions (Tables 2 and 3).

These findings were consistent with the strategy of comparing observed

Table 1. Characteristics of 37,815 adolescents enrolled in the Study of Cardiovascular Risk Factors in Adolescents (ERICA, 2013-2014)							
Variables	n	Median	IQR				
			400 000				

ı	Table 1. Characteristics of 37,815 adolescents enrolled in the Study of Cardiovascular Risk Factors in Adolescents (ERICA, 2013-2014)								
	Variables	n	Median	IQR					
ı				1°Q 3°Q					
	Age (years)	37,815	15	13	16				



MetS \* (%) 861 2.6 2.3 2.9 MetS components

Elevated WC\*\*\* (%) 4.386 12.6 11.6 13.7 High BP 2.677 82 (≥130/85mmHg) (%) High alucose 4.1

3.5 4.8 1.147 (≥100mg/dl) (%) Hiah TG (≥ 1.712 4.1 5.1 150mg/dl) (%)

13.076 32.7 30.3 35.2 Low HDL-c\*\* (%) Obesity (%) 3.097 Diabetes<sup>r</sup> 1,552 3.9 3.5 Self-report Diabetes® 1.244 3.3 2.9

Self-report diabetes 155

Fasting glucose 0.4 0.8 205 0.5 Low (≥126mg/dL) Hb1Ac (≥6.5%) 112 0.3 9.2 15.3 PDefinition of metabolic syndrome: elevated waist circumference (values ≥ 90th percentile aged for those

0.5

ed 10 to 16 years old; for those aged 16 years or older, > 90cm for males and > 80 cm for females) and the presence of two or more risk factors high triglycerides ≥ 150mg/dl, and/or high glucose ≥100mg/dl, and/or low HDL-c <40mg/dl or hdl<50mg/dl in girls aged 16 and 17 and/or high blood pressure ≥130/85mmHg 'values ≥ 90th percentile aged for those aged 10 to 16 years old; for those aged 16 years or older, ≥ 90cm for males and > 80 cm for females

able 2. Adjusted\* prevalence ratio to assess interaction of High and Elevated WC with diabetes stratified by HDL and BP in the

7.815 adolescents included in the Study of Cardiovascular Risk Factors (ERICA, 2013-2014) Stratified by Low HDL<sup>8</sup> or High BP<sup>§</sup> WC\*\* Adjusted PR Homogeneity 1 (Ref. category) P-value=0.02 Normal Normal High 0.73 (0.38, 1.41) (n=12,578)Normal Hiah Normal 1 (Ref. category)

Table 3. Adjusted\* prevalence ratio to assess interaction of High TG and Low HDL-c with diabetes F according to WC and Blood pressure in the 37,815 adolescents included in the Study of Cardiovascular Risk Factors (ERICA, 2013-2014) Stratified by Elevated WC\*\* and/or High BP\$  $TG^{\lambda}$ Adjusted PR HDI 8 Homogeneity test

3.23 (0.94, 11.13)

1 (Ref. category)

1.23 (0.50, 3.03)

1 (Ref. category)

4.53 (1.99, 10.31)

<sup>k</sup> High triglycerides: ≥ 150mg/dl aged 16 years or older, ≥ 90cm for males and ≥ 80 cm for females

ELow HDL-c: <40mg/dl or hdl<50mg/dl in girls aged 16 and 17

<sup>1</sup>defined by self-report, glucose≥126md/dL or Glycosylated haemoglobin≥6.5%

#### CONCLUSIONS

**RESULTS** 

Hiah

Normal

Normal

Low

7.6 8.9

0.3

High

Normal

High

Normal

High

Although interaction was not present in all possible combinations, high TG and low HDL or elevated interacted with regard to the prevalence of type 2 diabetes mellitus

vs joint expected associations (not shown).