

Reference values for blood pressure in European children aged 2-11 years: results of the IDEFICS study

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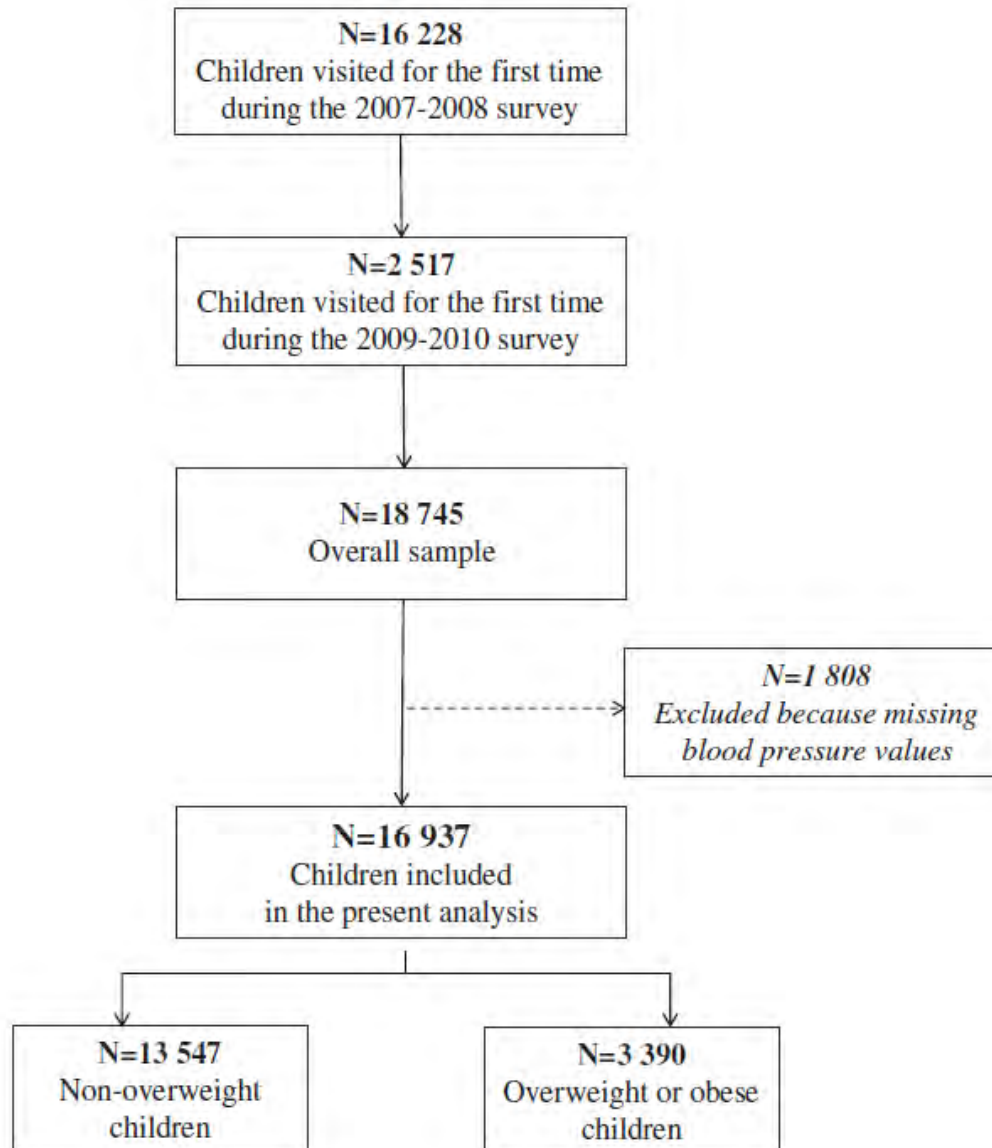
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- to provide oscillometric blood pressure reference values in European **non-overweight** school children participating in the IDEFICS study
- compare these values with those in the **total** IDEFICS population of children where also overweight and obese subjects are included

Methods: participants



	<i>Girls</i>	<i>Boys</i>
	<i>All</i>	<i>ALL</i>
<i>(a) entire population</i>		
<i>N</i>	8399	8538
Height (cm)	119 (13)	119 (13)
MMI (kg m⁻²)	16.5 (2.6)	16.5 (2.6)
Ow/Ob (%)	21.0	19.0
SBP Hg)	101 (9)	101 (9)
DBP Hg)	64 (6)	63 (7)
<i>(b) non-overweight children only</i>		
<i>N</i>	6609	6938
Height (cm)	117 (12)	118 (12)
MMI (kg m⁻²)	15.4 (1.3)	15.6 (1.2)
SBP Hg)	100 (9)	100 (8)
DBP Hg)	63 (6)	62 (6)

mean (s.d.)

- Standardised method: IDEFICS survey manual and special training camps for survey staffs
- Oscillometric measurement with automated blood pressure and pulse meter: Welch Allyn 4200B-E2 Sphygmomanometer
- Right arm circumference was measured at standardised measurement points
- Cuff was chosen /using a table/ according to arm circumference
- Child relaxed and in sitting position
- 2 (-3) recordings. Mean value used

- Age- and height-specific systolic and diastolic pressure percentiles were calculated by GAMLSS, separately for boys and girls
- Analysis:
 - a) the entire population (n=16 937)
 - b) the non-overweight children only (n=13 547).

Results: percentile tables

Table 2. Percentiles of systolic BP (mm Hg) in non-overweight children

Age (years)	Ht (cm)	Percentiles for girls								
		1	3	10	25	50	75	90	97	99
2- < 3 (n=200)	85	76.1	78.6	82.1	86.0	90.7	96.0	101.5	108.0	113.7
	87	76.6	79.1	82.7	86.6	91.3	96.6	102.2	108.7	114.4
	89	77.1	79.6	83.2	87.1	91.9	97.3	102.9	109.4	115.2
	92	77.8	80.4	84.0	88.0	92.8	98.2	103.9	110.5	116.3
	94	78.3	80.9	84.6	88.5	93.4	98.8	104.5	111.2	117.0
	97	79.1	81.7	85.4	89.4	94.2	99.8	105.5	112.2	118.1
	100	79.8	82.4	86.2	90.2	95.1	100.7	106.5	113.3	119.2
7- < 8 (n=1945)	115	80.7	84.0	88.4	92.9	98.2	103.7	109.1	114.9	119.6
	119	81.7	85.0	89.4	94.1	99.4	105.0	110.4	116.3	121.0
	123	82.6	86.0	90.5	95.2	100.5	106.2	111.7	117.7	122.5
	126	83.4	86.7	91.3	96.0	101.4	107.2	112.7	118.7	123.6
	130	84.3	87.8	92.4	97.1	102.6	108.4	114.0	120.1	125.0
	133	85.1	88.5	93.2	98.0	103.5	109.4	115.0	121.1	126.1
	137	86.1	89.5	94.2	99.1	104.7	110.6	116.3	122.5	127.5

Height percentiles
3rd, 10th,
25th, 50th,
75th, 90th,
97th

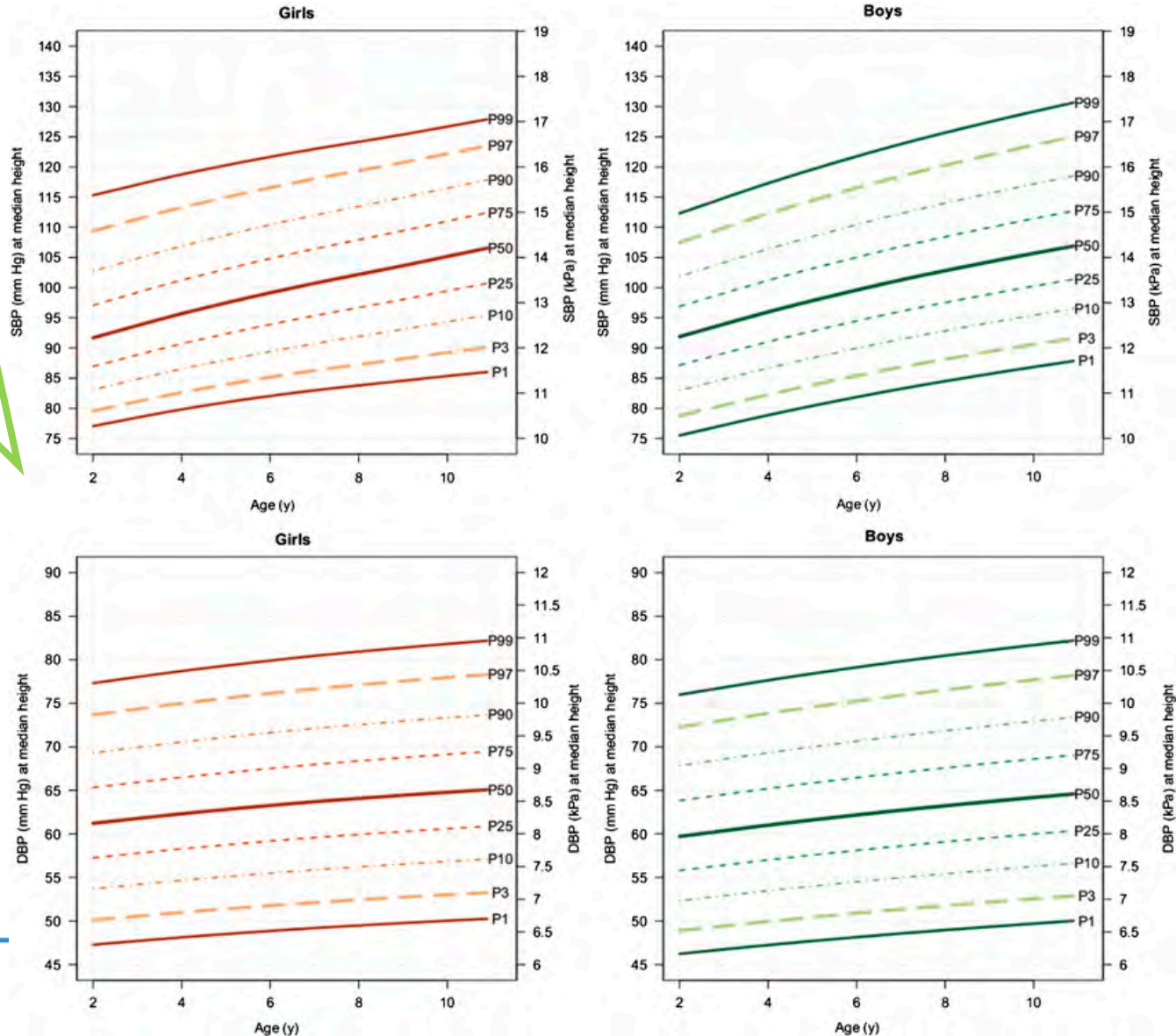
Results: percentile curves

SBP:

-higher in girls than in boys up to the age of 5 years; subsequently the trend was reversed, - the older the child, the greater the difference between sexes.

DBP:

- higher in girls than in boys at any age.

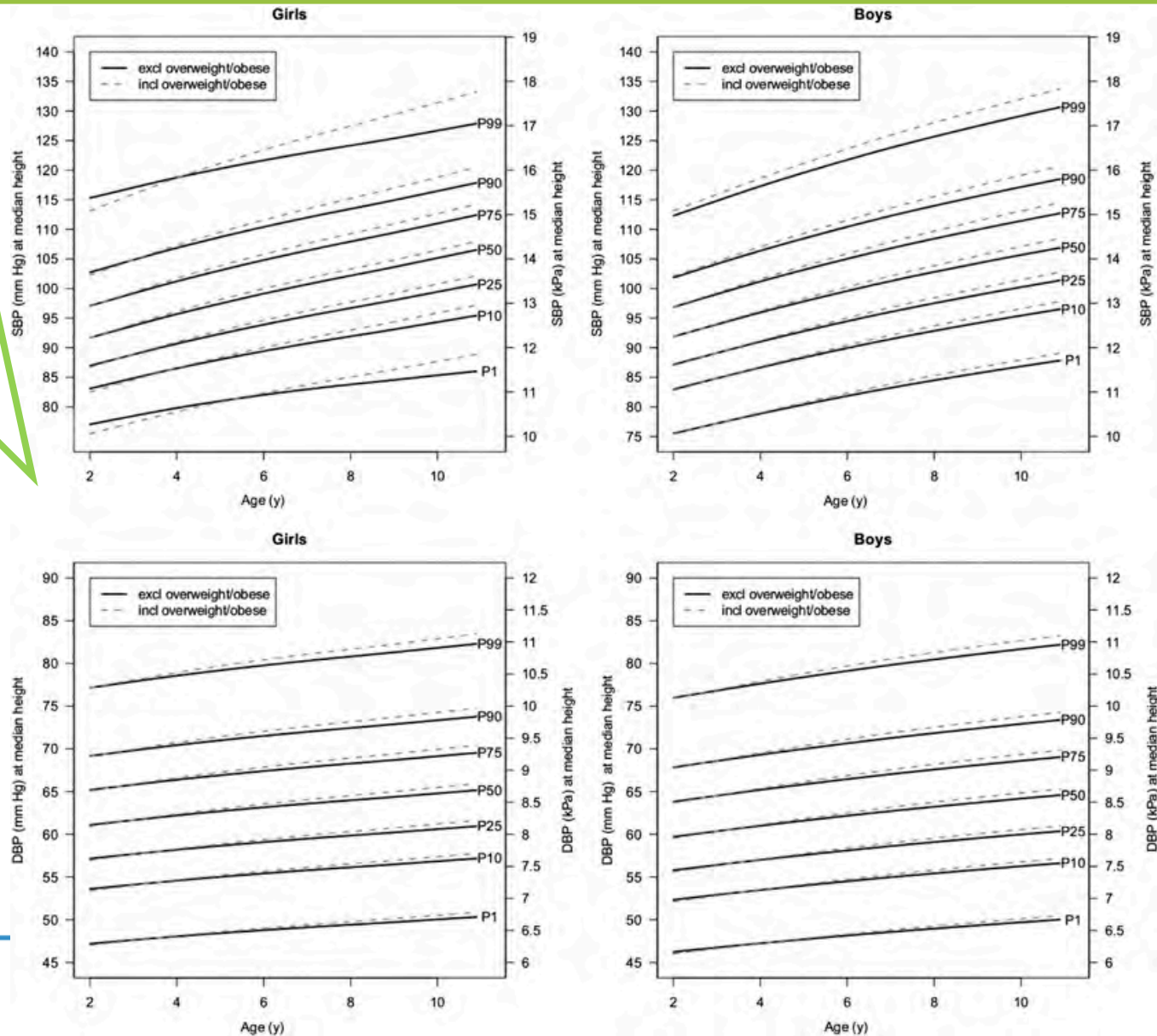


Results: sensitivity analysis

SBP:
differences
between sexes
more pronounced
at an older age
and at the
extremes of the
distribution.

Girls: greater
differences (earlier
maturation? Higher
prevalence of
obesity?)

DBP: no sign.
differences



Oscillometric devices:

Welch Allyn device validated

Easy to perform

Less observer bias

Less white coat impact

Often used in newborns and infants

Diastolic pressure differences vs auscultation ?

Mean arterial pressure is measured: Syst- and Diastolic calculated

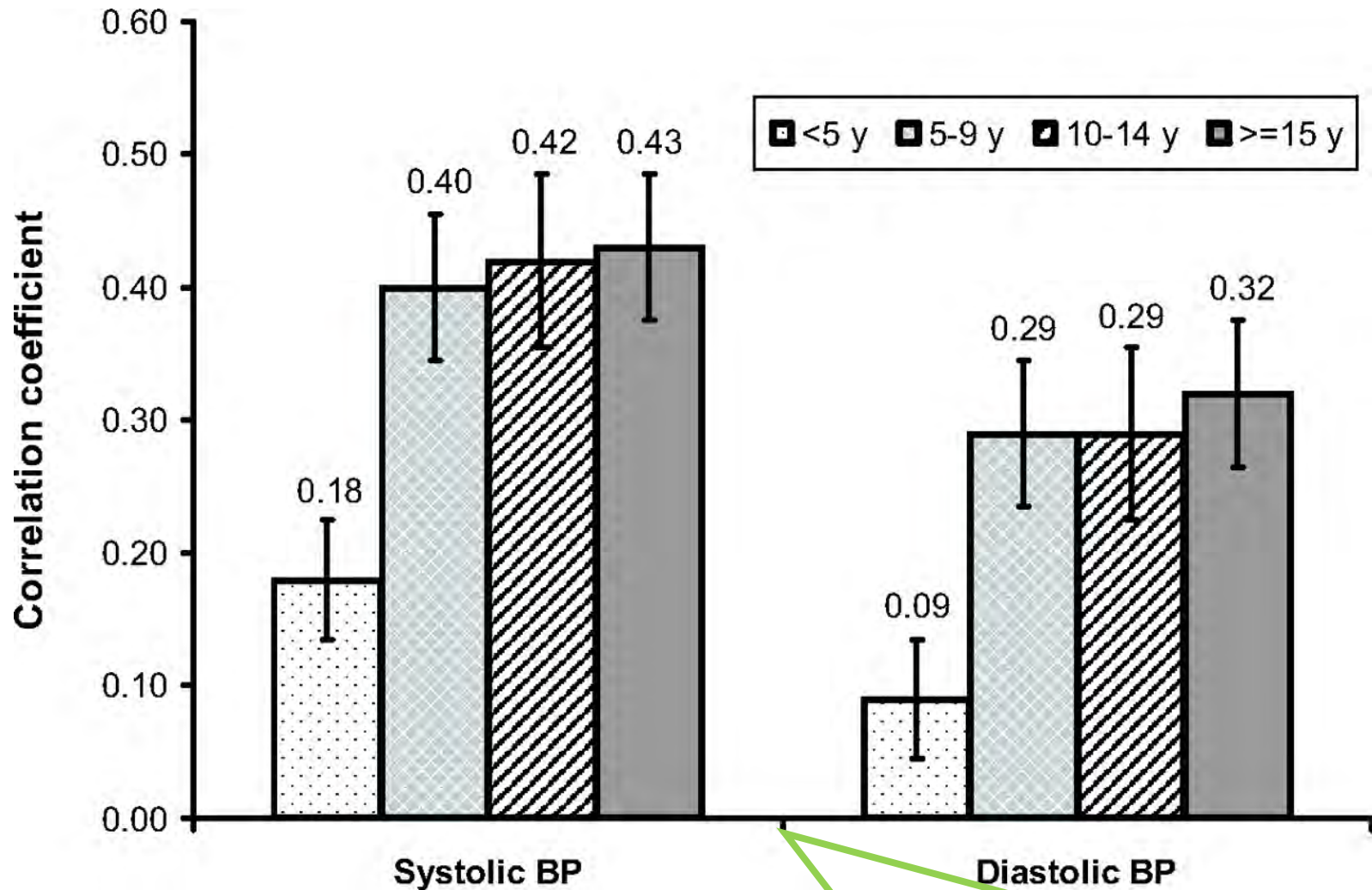
statistical work-up re the distribution of blood pressure values

Pre-hypertension = 90th pct,

Hypertension = 95th pct or 120/80

- Repeated measurement x 3 required for clinical diagnosis
- Must be validated with auscultation + mercury-manometer
- Ambulatory BP measurement

Figure 4. Least square means of BP tracking correlation coefficients for baseline age, adjusted for length of follow-up.



Chen X, and Wang Y *Circulation*. 2008;117:3171-3180



BP tracking correlation coefficients had an average of 0.38 for SBP and 0.28 for DBP, $P < 0.001$

BMI and blood pressure

- ❑ The higher the BMI, the higher blood pressure, not physiologic
 Insulin resistance effect on kidney circulation, sodium retention
- ❑ Blood pressure effects on adolescents with obesity :
 - Increased intimal wall thickness
 - Reduced cardiac vagal activity
 - Left ventricular hypertrophy
 - Smaller nocturnal fall in SBP
- ❑ Treat obesity ! Maybe add pharmacological treatment ?

- The present analysis provides updated reference values for blood pressure in children aged 2 to below 11 years
- To use for BP monitoring and planning population strategies for disease prevention.

Thank you for your attention

This presentation is based on the paper:

G Barba†, C Buck, K Bammann, C Hadjigeorgiou, A Hebestreit, S Mårild, D Molnár, P Russo, T Veidebaum, K Vyncke, W Ahrens and LA Moreno on behalf of the IDEFICS consortium: Blood pressure reference values for European non-overweightschool children: The IDEFICS study. *International Journal of Obesity* (2014) 38, S48–S56

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