

Risk factors of childhood obesity: Lessons from the European IDEFICS study

Wolfgang Ahrens, Iris Pigeot

on behalf of the IDEFICS Consortium

Leibniz Institute for Prevention Research and Epidemiology – BIPS

ECOG-ebook on Childhood Obesity



Identification and prevention of Dietary- and lifestyle-induced health **E**ffects **I**n **C**hildren and infant**S**

➤ Objectives:

- Enhance knowledge of **health effects of changing diet & altered social environment & lifestyle** of children, 2-9 years, in Europe,
- Develop, implement & evaluate specific intervention approaches to **reduce prevalence of diet- & lifestyle-related diseases & disorders.**

➤ Known modifiable risk factors:

- **Nutrition**
- **Physical activity**
- **Stress**

Knowledge

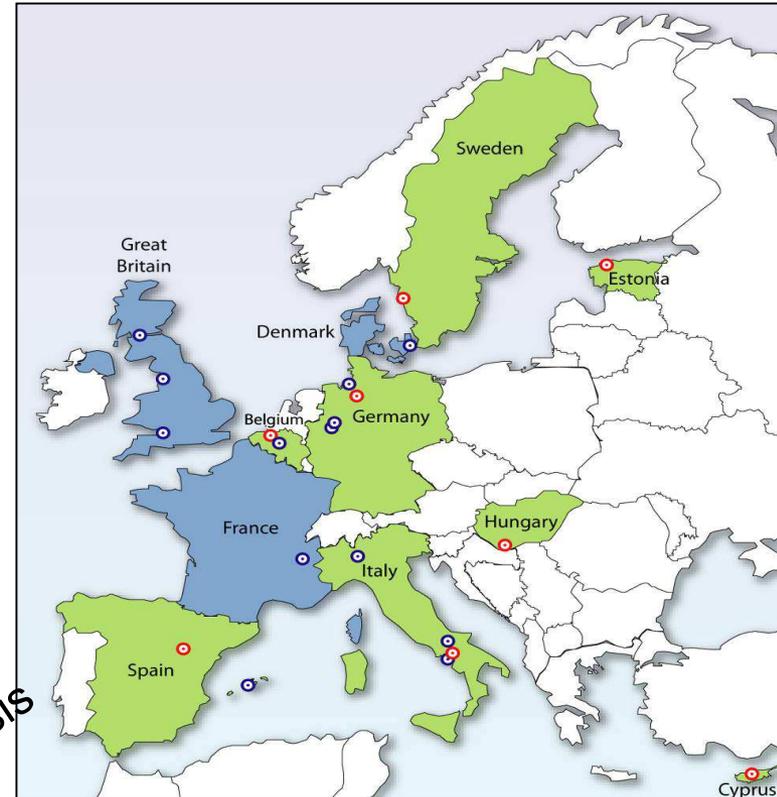
Starting basis

Specific intervention targets

→ **Intervention study**

New knowledge on aetiological mechanisms

→ **Analytical study**



➤ Study design

- **Approach through schools and kindergartens**
- **Longitudinal:** comparison of baseline (T_0) with follow-up (T_{1-2})
- **Controlled:** intervention / control communities with similar socio-demographic profile (non-randomised)

➤ Sample size:

- **N=16,228 at baseline (2-9 years)**
- **N=13,498 at follow-up (4-11 years)**

Design and methods in: IJO supplement (2011), edited by Page A & Winklhofer-Roob B

*Ahrens W et al. Understanding and preventing childhood obesity and related disorders – IDEFICS: A European multilevel epidemiological approach. **Nutrition, Metabolism & Cardiovascular Diseases**. 2006; 16(4): 302-308.*

*Ahrens W et al. The IDEFICS cohort: design, characteristics and participation in the baseline survey. **Int J Obes (Lond)**. 2011; 35 (Suppl. 1): S3-S15.*

...addresses first strategic objective:

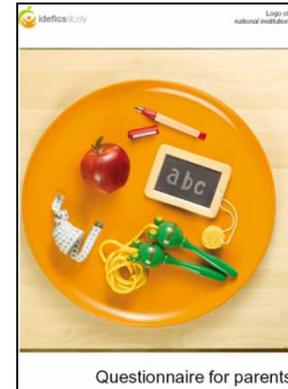
to enhance the knowledge of the **health effects of a changing diet & an altered social environment & lifestyle** of children in Europe



*Ahrens W et al. Understanding and preventing childhood obesity and related disorders – IDEFICS: A European multilevel epidemiological approach. **Nutrition, Metabolism & Cardiovascular Diseases.** 2006; 16(4): 302-308.*

*Ahrens W et al. The IDEFICS cohort: design, characteristics and participation in the baseline survey. **Int J Obes (Lond).** 2011; 35 (Suppl. 1): S3-S15.*

- Questionnaires (parent)
 - **Social factors, lifestyle + PA**
 - **Eating behaviour + FFQ**
 - **Medical history**
- 24-hour dietary recall + school meals
 - **SACINA:** computer-based 24-hour dietary recall
- Physical activity
 - **Accelerometer:** 3 days



Bammann K , Ahrens W (eds.). Measurement tools for a health survey on nutrition, physical activity and lifestyle in children. To appear in the Springer Series "Epidemiology and Public Health". 2014

Core variables & add-ons

- Physical examination
 - **Anthropometry**
 - **Blood pressure**
 - **Musculoskeletal disorders**
(calcaneal ultrasonometry)
- Biological markers
 - **Blood**
 - **Saliva / mouth swab**
 - **Urine**



Additional variables assessed in subgroups

- Special examinations
 - **Food tasting** (food preference, taste sensitivity)
 - **Aerobic fitness** (using parts of the *Eurofit* test battery for children aged 6 to 10 years)
 - **Age-specific motor tests** (hand-grip strength, strength of back muscles, hip flexibility test, motor skills)
 - **Food advertising effects** (media literacy, internal & external triggers)
- (Pre-) school environment (in selected centres): GIS
 - **Opportunities for physical activity**
 - **Food supplies**



...addresses second strategic objective:

to develop, implement & validate specific intervention approaches in order to **reduce the prevalence of diet- & lifestyle-related diseases & disorders in the EU**



*De Henauw S et al. The IDEFICS community oriented intervention program. A new model for childhood obesity prevention in Europe. **Int J Obes (Lond)**. 2011; 35 (Suppl. 1): S16-S23.*

IDEFICS Intervention

Community-oriented

Setting-based

Intervention mapping in 5 steps

3 x 2 key messages
(diet, stress, physical activity)

Programme:
10 modules at 4 levels

Participation
of stakeholders

Community

e.g.
Media campaign

Involvement of community partners

Intervention: 6 key messages

Nutrition



Daily water
→ **Less soft drinks**

Daily fruit & vegetables

Physical activity



Reduce TV-viewing

Daily PA
→ **Safe bicycle lanes**
→ **Outdoor playing**

Stress

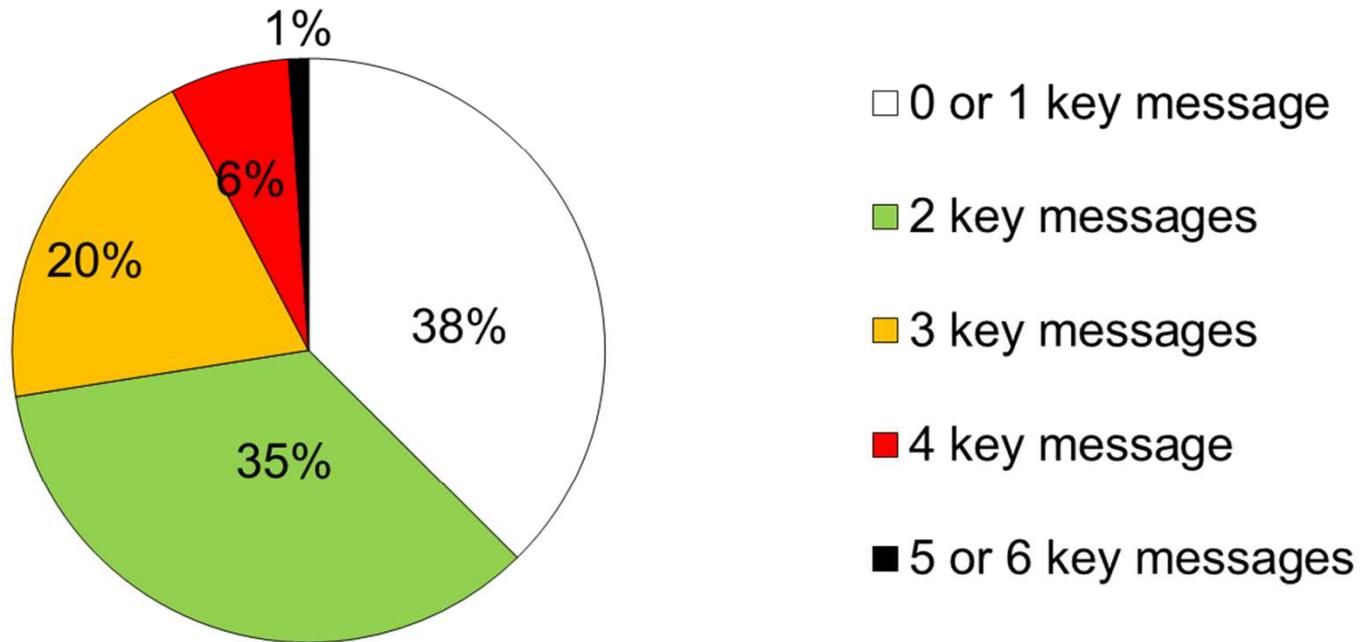


Spend more time together
→ **Family time**

Adequate sleep duration



Adherence to the 6 IDEFICS key messages



... with respect to the six key messages

Dietary behaviour

Food patterns: principal component analysis

Dietary pattern	Components	Explained variance
Snacking	Sandwiches (including hamburgers, hotdogs, and kebabs); butter or margarine on bread; savoury pastries; chocolate, candy bars; white bread; veg. cooked	10%
Sweet & fat	Chocolate- or nut-based spreads on bread; cakes, pastries, and puddings; sweets/candy; fried meats; soft drinks (sugar added and diet); mayonnaise and similar; cured meat and sausages	6%
Veg. & wholemeal	Raw vegetables; wholemeal bread; cooked vegetables; fresh fruit (no added sugar); milk (no added); breakfast cereals (no added sugar); low-fat butter or margarine on bread	5%
Protein & water	Fish fresh, not fried; water; fried fish, fish-fingers; eggs, not fried; fresh meat, not fried; pasta, rice; pizza as main dish; butter or margarine on bread	4%

Risk of becoming overweight/obese over two years of follow-up by food pattern

Dietary pattern	Tertile (reference = low)	Adj. OR	95% CI
Snacking	middle	1.09	(0.88-1.35)
	high	1.18	(0.91-1.52)
Sweet & fat	middle	1.08	(0.88-1.33)
	high	0.97	(0.77-1.22)
Veg. & wholemeal	middle	0.76	(0.62-0.94)
	high	0.69	(0.54-0.88)
Protein & water	middle	1.00	(0.80-1.25)
	high	0.95	(0.74-1.23)

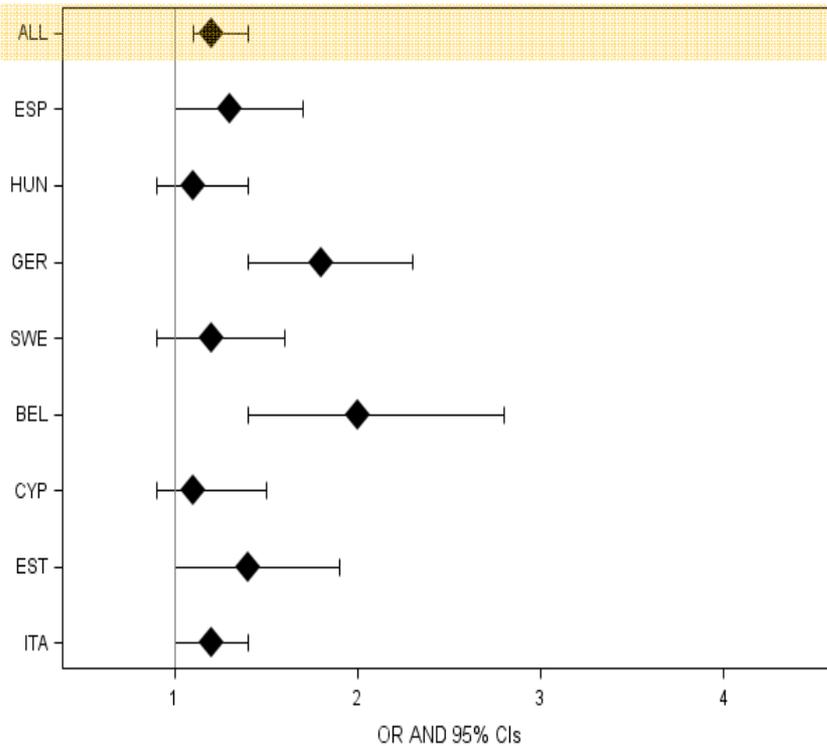
Odd ratios (OR) with 95% confidence intervals from mixed effects logistic regression with country as “random effect”; **adjusted** for baseline BMI, sex, age, hours of physical activity/week (continuous), country specific income (low, low/medium, medium, medium/high and high)

TV viewing

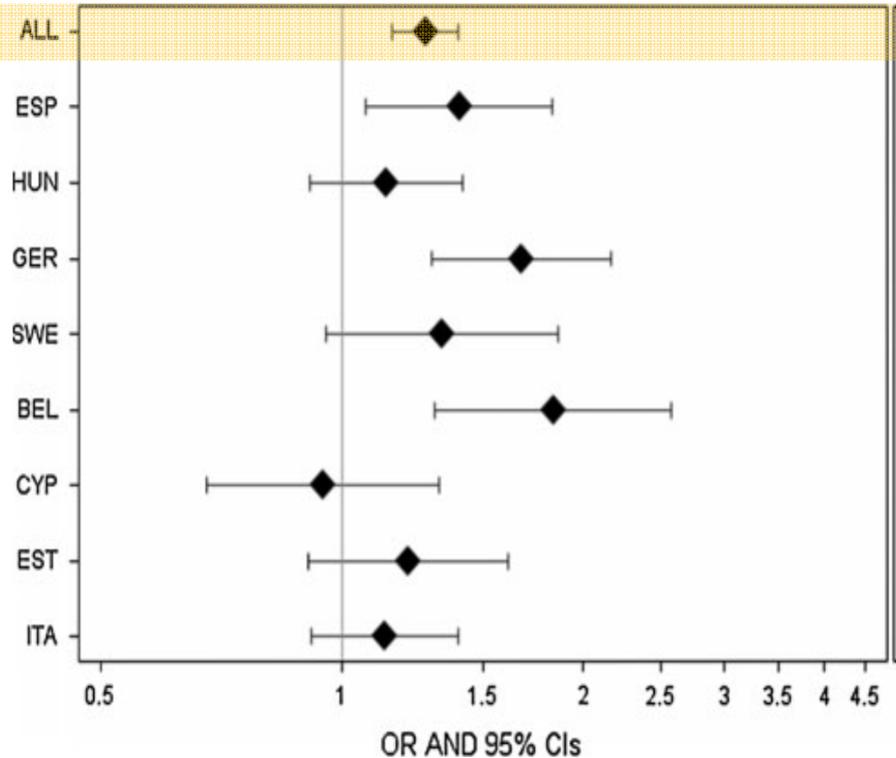
TV consumption & OW/obesity

– prevalence odds ratios –

Duration of TV consumption (TV60)



Regularly eat meals while watching TV (EatTV)



Odds ratios (OR) and 95% confidence intervals (CI) adjusted for sex, age, parental education, country (all)

Physical activity and the built environment

- Which characteristics of the built environment influence physical activity levels in the home environment of children?
 - **Land use** (Frank et al., 2005)
 - **Playgrounds, green spaces and sports facilities** (Black and Macinko, 2008)
 - **Bikeways and footpaths** (Sallis et al., 2009)
 - **Intersections** (Frank et al., 2005)

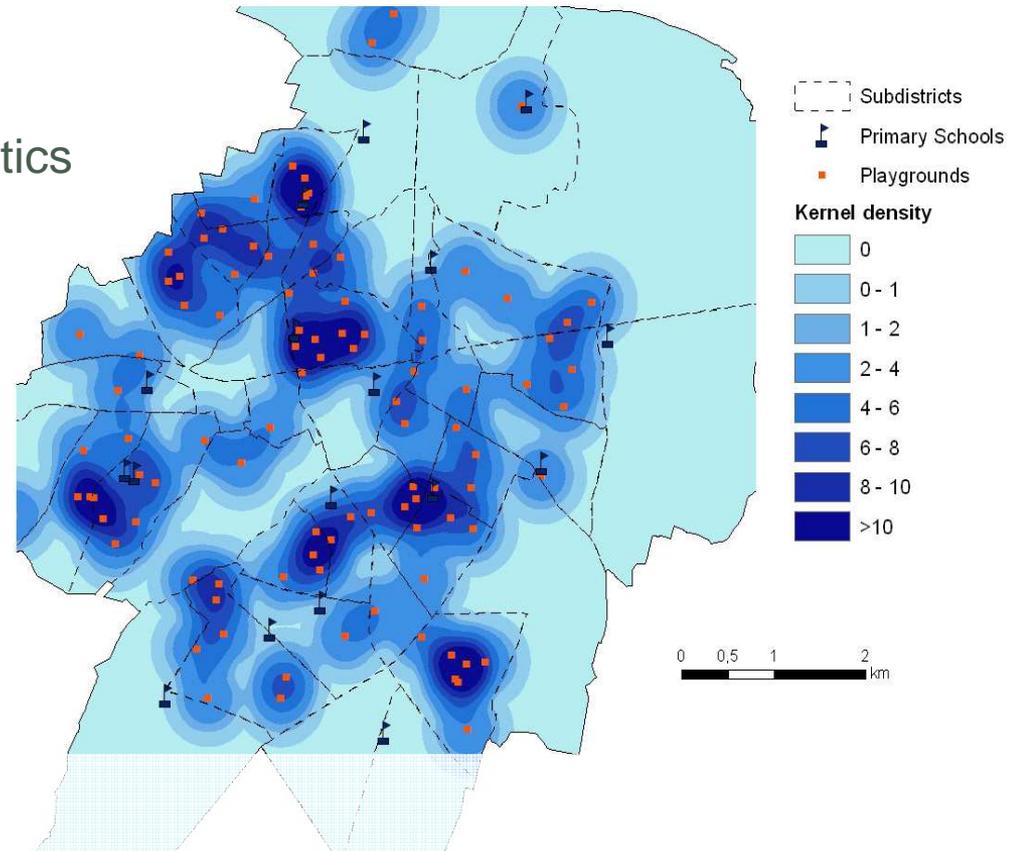
- How can we assess these characteristics?

➤ Geostatistical measures:

- Availability of urban characteristics
- Kernel density

➤ Moveability index:

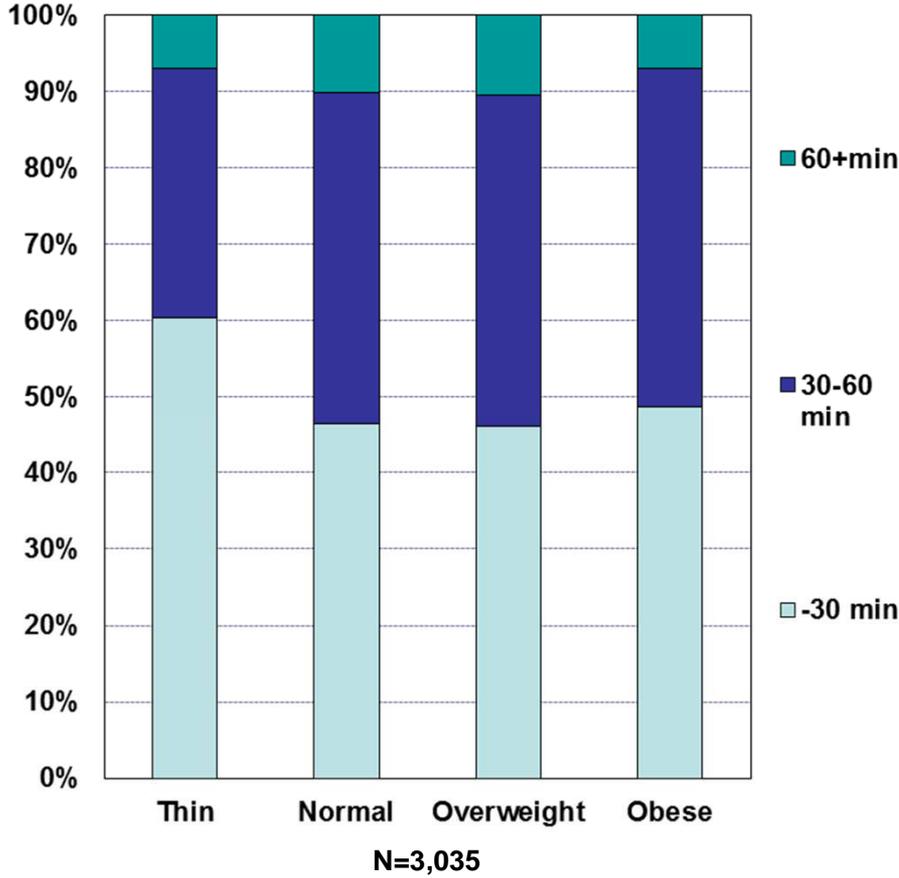
- Mean z-scores of measures of urban characteristics
- Pilot study (317 children): positive association with PA (AVG CPM)



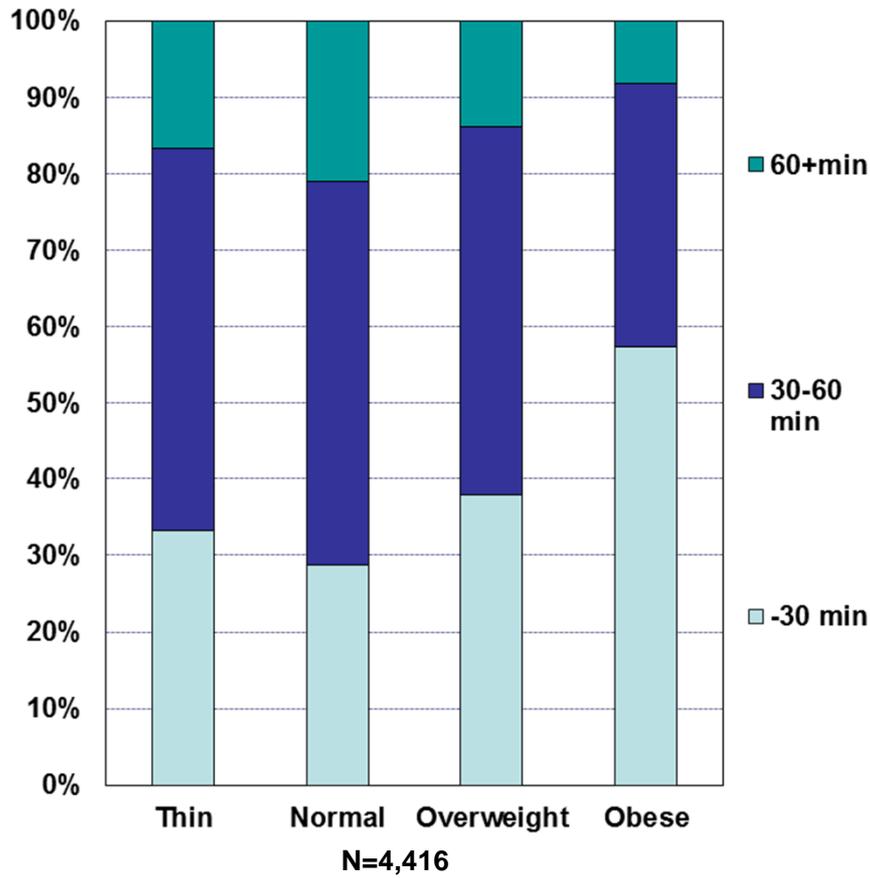
Duration of MVPA across Europe (60 sec interval, Evenson et al., 2008)



2-5 years



6-9 years



EC DG Research. Publishable final activity report: IDEFICS –Identification and prevention of dietary- and lifestyle-Induced health effects in children and infants. Brussels 2012. <http://www.ideficsstudy.eu/Idefics/webcontent?cmd=innerDoc&path=2908&start=true>



See also: Konstabel K et al. Objectively measured physical activity and sedentary time in European children: the IDEFICS study. To appear in *Int J Obes (Lond)*. 2014; Suppl.



Sleep duration

Odds ratios for overweight by sleep duration

Adjusted OR*	>10h to ≤ 11h	>9h to ≤ 10h	≤ 9h
Pre-school	0.93 (0.63; 1.36)	1.08 (0.73; 1.61)	1.38 (0.87; 2.19)
School	1.46 (0.96; 2.22)	1.88 (1.23; 2.86)	3.53 (2.24; 5.54)
All	1.10 (0.84; 1.45)	1.36 (1.03; 1.80)	2.22 (1.64; 3.02)

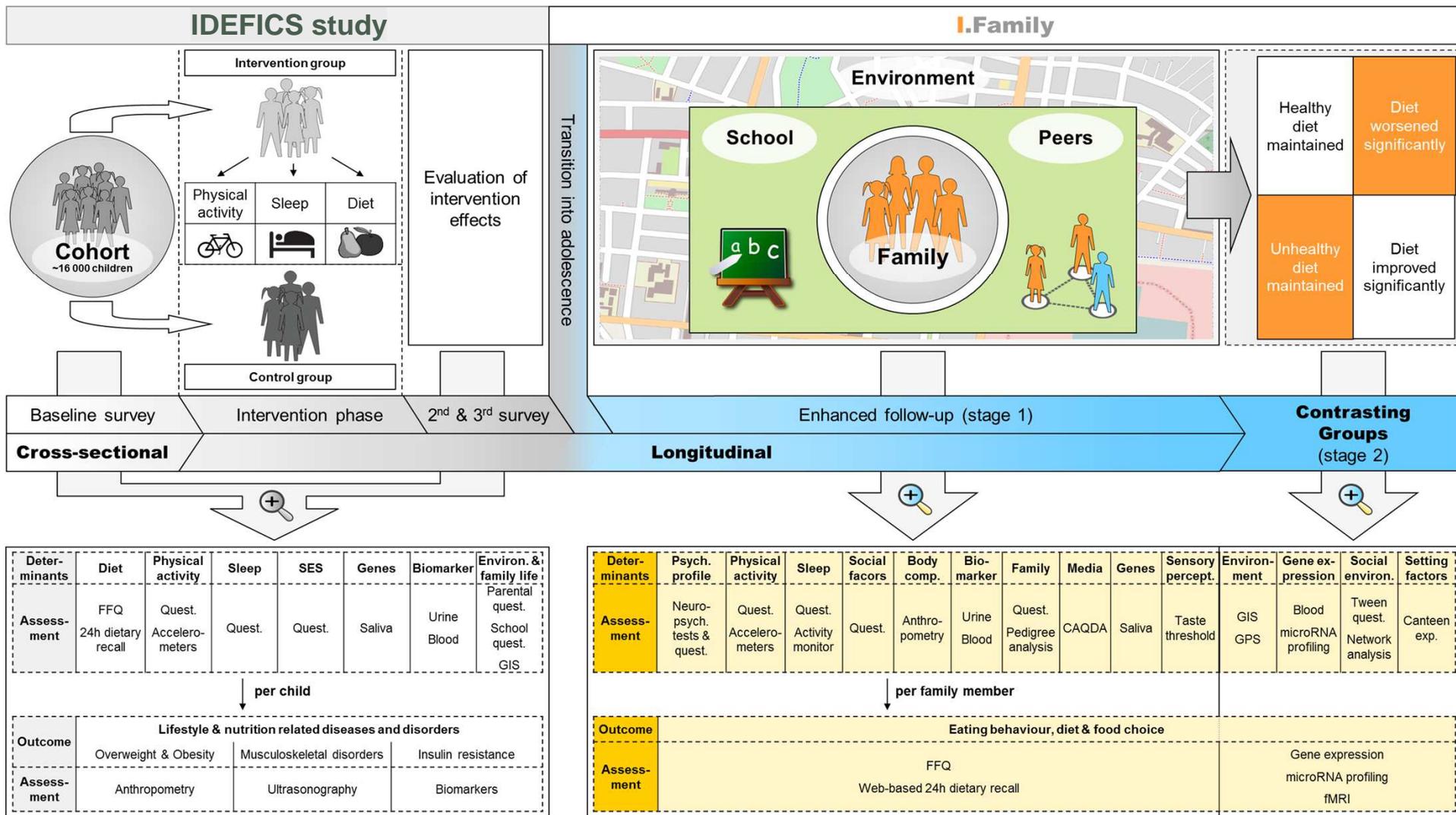
Ref. >11 h; OR, 95% CI; *adjusted for age (continuous), ambient temperature (continuous), European region (north versus south)

What next?



**Determinants of eating behaviour in
European children, adolescents and their parents**

Longitudinal design of I.Family and concatenation with IDEFICS



Work programme



- To study the impact of biological, socio-behavioural, genetic and environmental factors on dietary behaviour by **comparing subjects who developed in an unfavourable direction with those who maintained a healthy diet**
- To study **brain activation, expression of genes** related to food choice, biological and genetic basis for **taste thresholds**, role of **sleep, sedentary time, physical activity** and **built environment** in subgroups with contrasting dietary profiles
- To study the **prognostic value of body composition and cardio-metabolic markers** by linking them to diet and interacting factors
- To derive effective communication **strategies to empower EU consumers** to induce favourable behaviour changes



www.idefics.eu

www.ifamilystudy.eu



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