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

Expected future insights from the I.Family Study

Iris Pigeot, Wolfgang Ahrens
University Bremen and
Leibniz Institute for Prevention Research and Epidemiology – BIPS
- on behalf of the I.Family consortium -

Funded by the EC, FP 7, Project No. 266044 – Building on idefics study

I.Family in brief

Coordinator: Wolfgang Ahrens (D)

Deputy coordinators: Alfonso Siani (I), Iris Pigeot (D)

Call: FP7-KBBE-2010-4

Funding scheme: CP-IP Large-scale integrating project

Grant requested : 9 mill. €

Duration: 60 months, started in March 2012

No. of partners: 17 (incl. 1 SME)

Participating countries: Cyprus, Belgium, Denmark, Estonia, Germany, Finland, Hungary, Italy, Spain, Sweden, The Netherlands, United Kingdom

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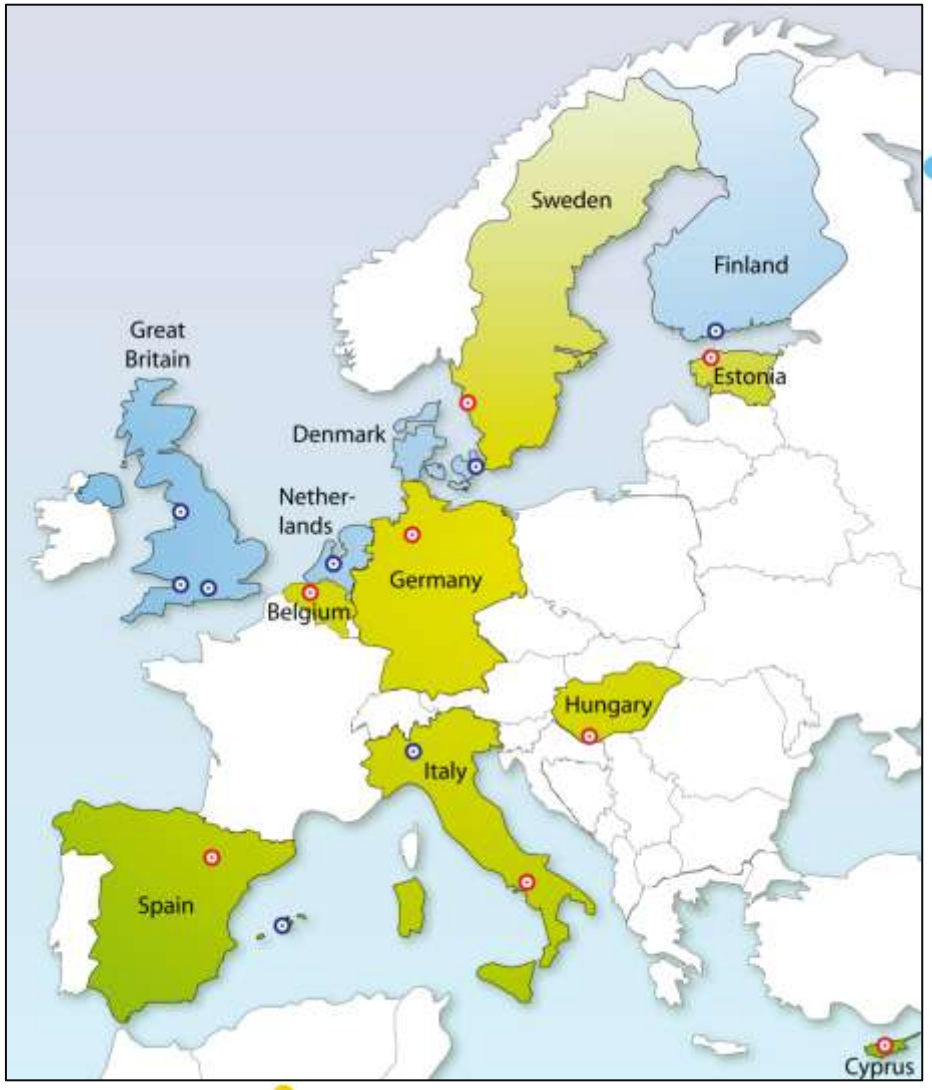
Partners



1. Strovolos, Cyprus
2. Ghent, Belgium
3. Copenhagen, Denmark
4. Tallin, Estonia
5. Helsinki, Finland
6. Bremen, Germany
7. Pécs, Hungary
8. Avellino, Italy
9. Milan, Italy
10. Utrecht, Netherlands
11. Palma de Mallorca, Spain
12. Zaragoza, Spain
13. Gothenburg, Sweden
14. Bristol, United Kingdom
15. Lancaster, United Kingdom
16. Andover, United Kingdom

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Aim: make significant contribution to reduce burden of nutrition-related diseases

- Understand interplay between **barriers and main drivers** of a healthy food choice
  - **Focus on individual and his/ her family**
  - **Assess dynamic nature of causal factors over time and during transition into adolescence**
  - **Unique opportunity: follow-up of the IDEFICS cohort (16.000 EU children 2-10 years in 2007) + extension to family members**
- Develop and disseminate **strategies to induce changes** towards a healthy behaviour in consumers

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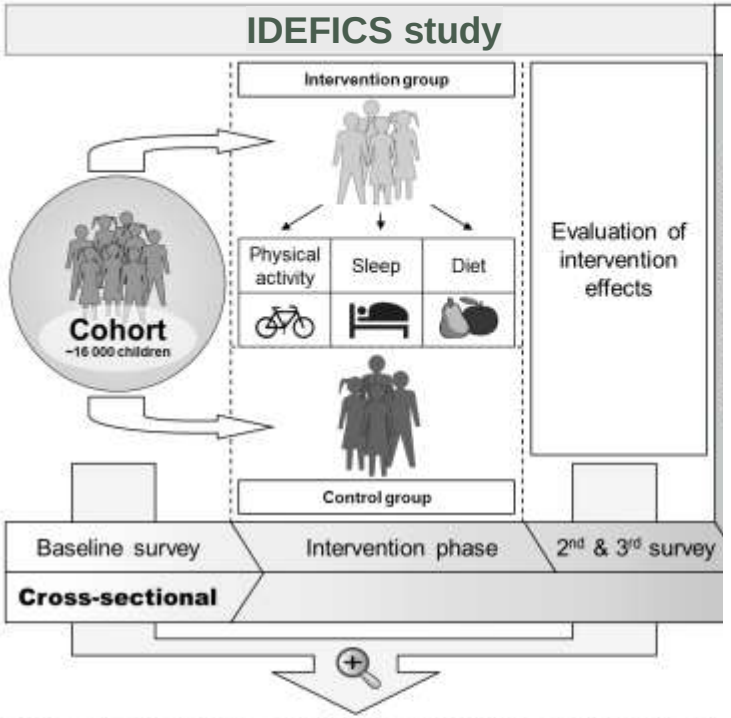
Longitudinal design of I.Family and concatenation with IDEFICS



Deter-minants	Diet	Physical activity	Sleep	SES	Genes	Biomarker	Environ. & family life
Assess-ment	FFQ 24h dietary recall	Quest. Accelero-meters	Quest.	Quest.	Saliva	Urine Blood	Parental quest. School quest. GIS

per child

Outcome	Lifestyle & nutrition related diseases and disorders		
	Overweight & Obesity	Musculoskeletal disorders	Insulin resistance
Assess-ment	Anthropometry	Ultrasonography	Biomarkers

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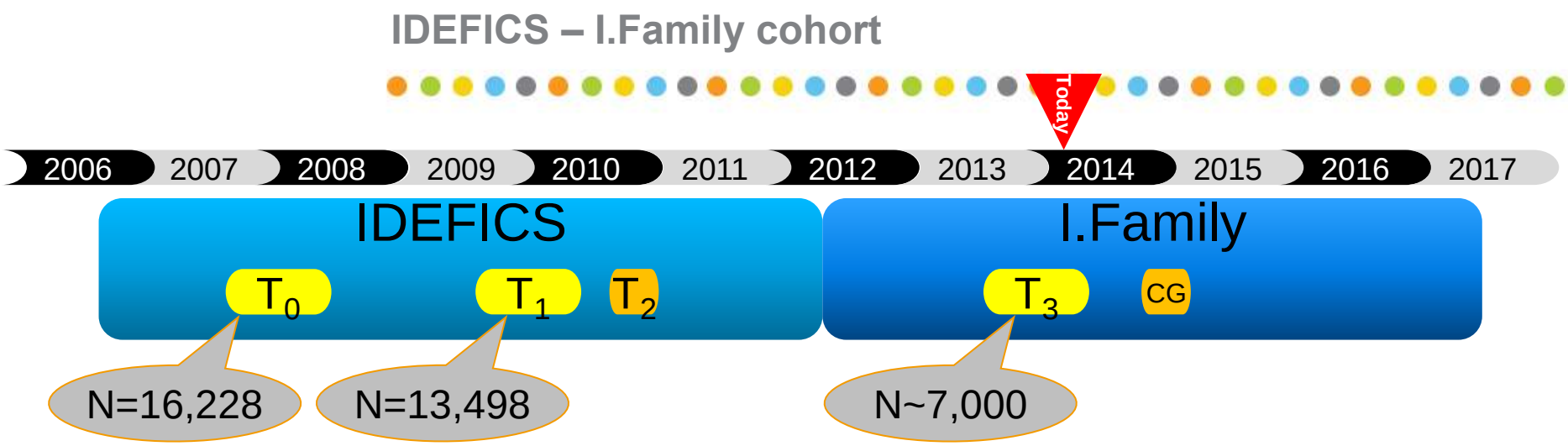
Timeline of recruitment and follow-up



- **T_3:** Follow-up of index children (plus siblings and parents)
- **CG:** Additional examinations in contrasting groups/ sub-groups: fMRI, GPS monitoring, sensory perception, canteen experiments
- **Endpoints:** Food choice, eating behaviour, health indicators (body composition, metabolic profile, bone health)

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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

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Instruments

- Questionnaires (parent + child)
  - **Social factors, lifestyle, peers + PA**
  - **Food preference, eating behaviour + FFQ**
  - **Medical history**
  - **Kinship**
- 24-hour dietary recall
  - **SACANA:** web-based 24-h dietary recall
- Physical activity
  - **Accelerometer:** 7 days

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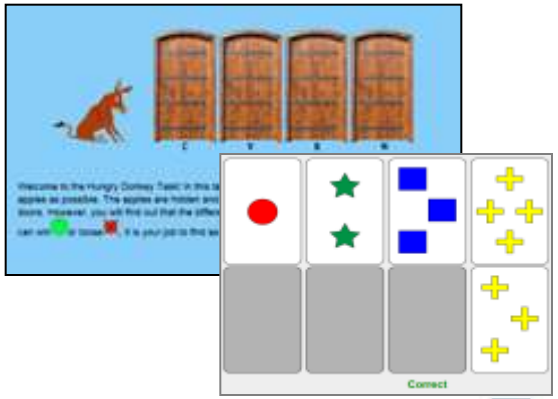
Examinations & Assessments

- Physical examination
  - **Anthropometry + blood pressure**
  - **Bone health:** ultrasonometry
- Biological markers
  - **Blood, saliva + urine**
- Add-ons, e.g.
  - **Sensory taste perception**
  - **Physical environment:** GIS + GPS
  - **Neuropsychological tests:** impulsitvity
  - **Brain mechanisms of food choice:** fMRI



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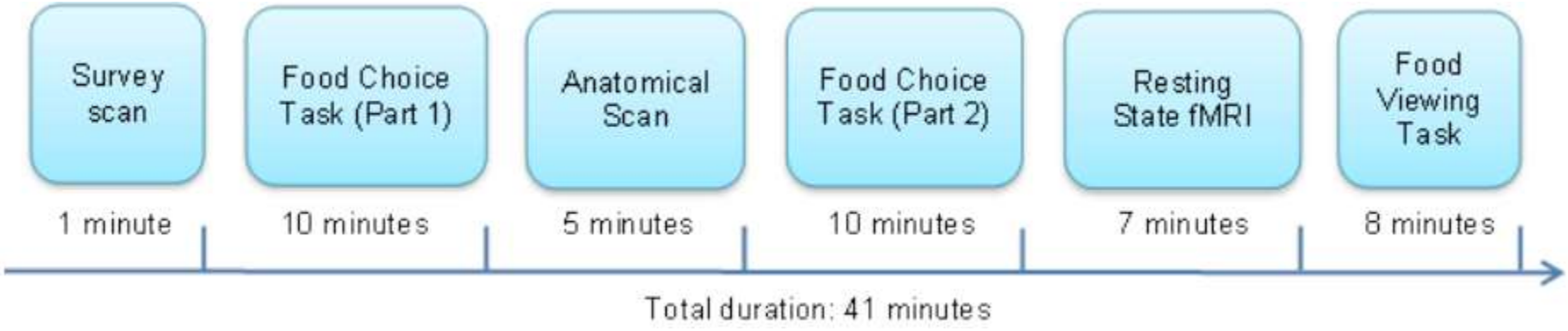
Functional neuro-imaging (fMRI)

- Determine differences in brain activation during (un)healthy food choice between selected groups of children and their parents
- Most informative: contrasting groups re. BMI, BMI-trajectory, healthy eating index



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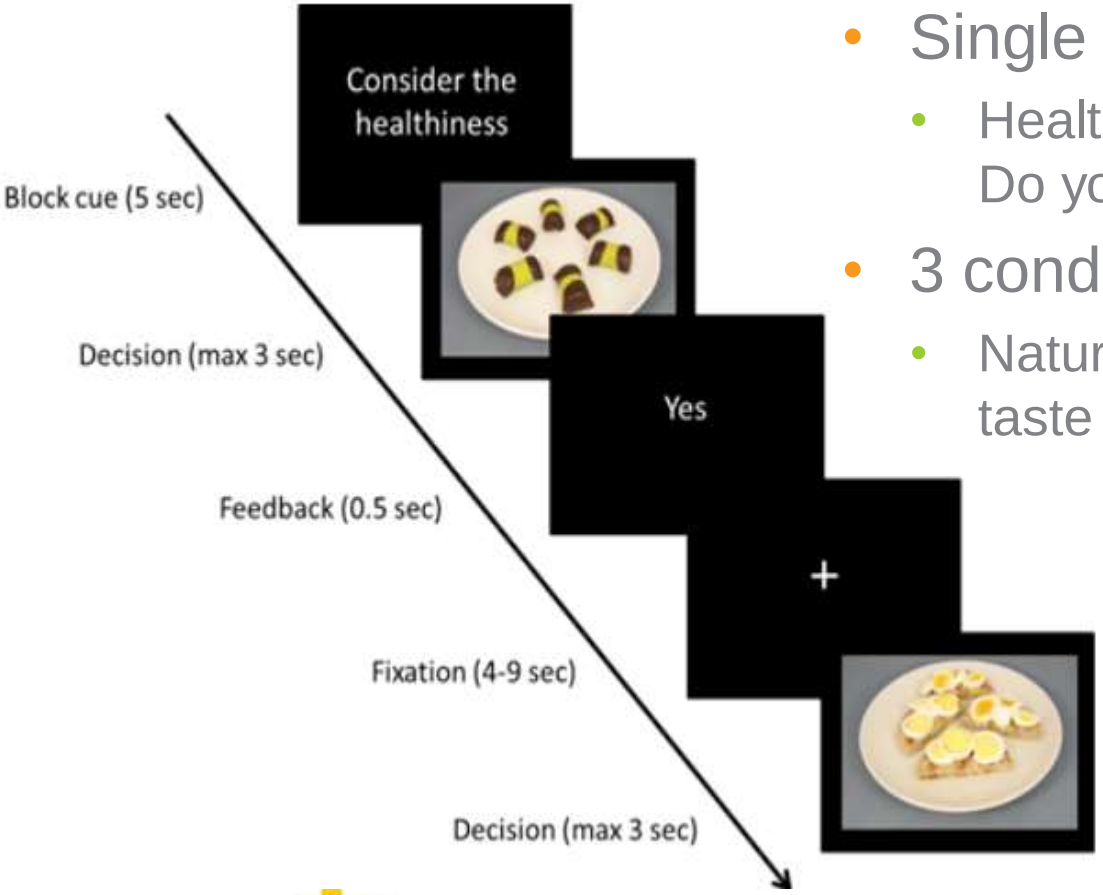
Food choice task (fMRI)



- Single item choice:
  - Healthy and unhealthy foods:
    Do you want to eat this after the scan?
- 3 conditions:
  - Natural, consider healthiness, consider taste

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Modules to assess traits, characteristics and exposures of study subjects (1 of 3)

Characteristic/ variable (trait/ outcome/ exposure)	Assessment method
Body composition (weight, height, waist/hip circumference, % body fat)	Anthropometry; BIA
Blood pressure	Automatic sphygmanometer
Brain activation	Neuroimaging (fMRI)
Neuropsychological characteristics (sensitivity for reward/punishment, trait impulsivity)	Neuropsychological quest. & tests
Eating habits (eating-out habits, snacking, eating during TV consumption)	Questionnaire
Dietary patterns (macro- & micro nutrients, portion size, total energy intake)	FFQ; 24-hour dietary recall
Food and health behaviour (binge / restrained / emotional eating, disinhibition, hunger,)	Children's questionnaire
Being breastfed, birth weight & height	Parental questionnaire
Being breastfed, birth weight & height, infant growth	Routine child health records
Gestational history (blood reports, position of baby, foetal heart details, blood pressure, urine data (sugar & albumen), oedema, weight gain, etc.)	Maternity cards (preg. check-ups)
Current medication	Inspection of drug packages
Medical history	Questionnaire
Smoking & alcohol, consumption	Questionnaire
Family rules & parenting style	Questionnaire
Social environment (income, education, family size & structure)	Questionnaire

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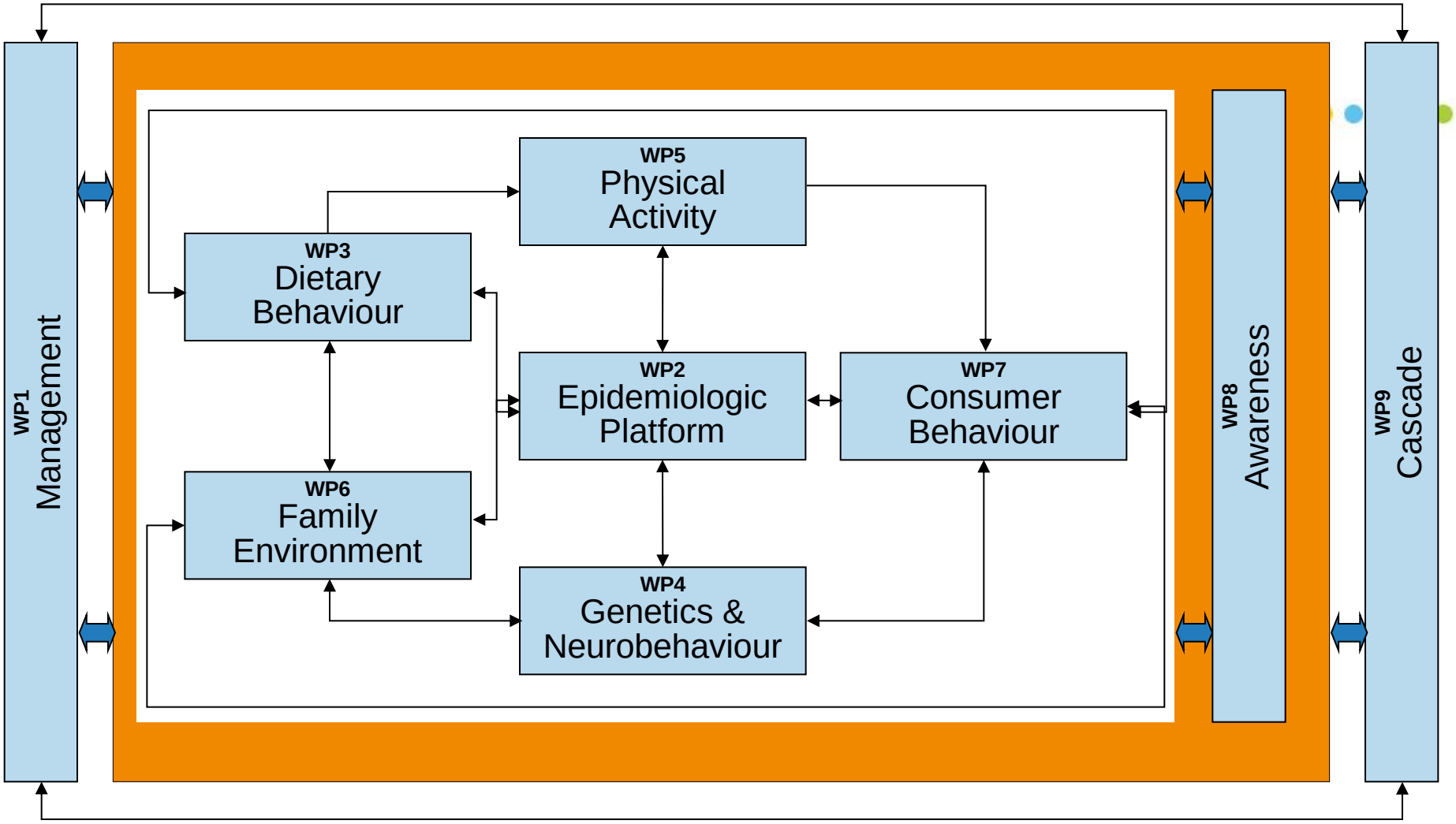
Modules to assess traits, characteristics and exposures of study subjects (2 of 3)

Characteristic/ variable (trait/ outcome/ exposure)	Assessment method
Psychological factors (attitudes, preferences, values, lifestyle behavioural tendencies)	Tween questionnaire
Neuropsychological profile (impulsive tendency, inhibitory control, set shifting)	(Web-based) neuropsych. tests
Media consumption (time spent watching TV/ playing video games)	Questionnaire
Media use (internet, mobile phones)	Questionnaire
Peer group pressure	Questionnaire; network analysis
Physical activity (type, duration, occasion)	Questionnaire
Physical activity (intensity, frequency, duration)	Accelerometer
Physical activity (place)	GPS monitor
Sleeping behaviour (duration)	Questionnaire
Sleep (quality, duration)	Activity monitor
Triggers of food choice (influence of choice architecture)	Canteen experiments

Modules to assess traits, characteristics and exposures of study subjects (3 of 3)

Characteristic/ variable (trait/ outcome/ exposure)	Assessment method
Social marketing strategies in practice Stage of change: identification of target groups	Web-based feedback tool Questionnaire
Neighbourhood deprivation index	Area-specific socio-economic data
Environmental determinants of food choice & physical activity	GIS data
Food preferences, sensory sensitivity (taste thresholds in subsamples)	Questionnaire; sensory tests
Genetic markers of food choice (taste receptors & neurotransmitter pathways)	DNA from mouth mucosal cells
Gene expression markers in peripheral blood	Messenger RNA (white blood cells)
microRNA profiling in peripheral blood	microRNA (peripheral blood)
Biochemical markers (albumin, kreatinin, minerals [Na, Mg, P, Ca, K])	Timed urine collection
Biochemical markers (blood lipids [cholesterol, triglycerides], glucose, vitamins, ß-carotene, FA profiles, HbA1c; CRP, hormones [insulin, leptin, adiponectin, ghrelin])	Venous blood (serum, plasma)

Workflow and work packages (WPs)



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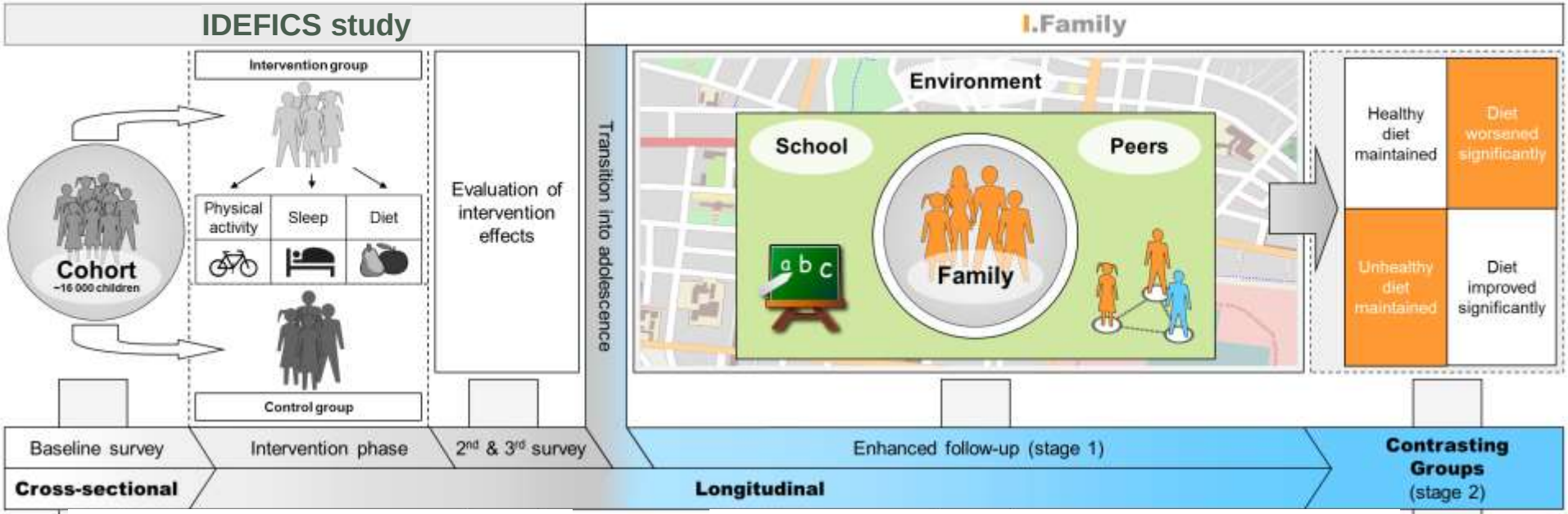
Thank you!



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Determinants	Diet	Physical activity	Sleep	SES	Genes	Biomarker	Environ. & family life
Assessment	FFQ 24h dietary recall	Quest. Accelero-meters	Quest.	Quest.	Saliva	Urine Blood	Parental quest. School quest. GIS

per child

Outcome	Lifestyle & nutrition related diseases and disorders		
	Overweight & Obesity	Musculoskeletal disorders	Insulin resistance
Assessment	Anthropometry	Ultrasonography	Biomarkers

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Determinants	Psych. profile	Physical activity	Sleep	Social facors	Body comp.	Bio-marker	Family	Media	Genes	Sensory percept.	Environment	Gene expression	Social environ.	Setting factors
Assessment	Neuro-psych. tests & quest.	Quest. Accelero-meters	Quest. Activity monitor	Quest.	Anthro-pometry	Urine Blood	Quest. Pedigree analysis	CAQDA	Saliva	Taste threshold	GIS GPS	Blood microRNA profiling	Tween quest. Network analysis	Canteen exp.

per family member

Outcome	Eating behaviour, diet & food choice	
Assessment	FFQ Web-based 24h dietary recall	Gene expression microRNA profiling fMRI

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FP7 Work Programme 2010

Theme 2 Food, Agriculture and Fisheries, and Biotechnology (29 July 2009)

KBBE.2010.2.1-01: Determinants of food choice and eating habits

Call: FP7-KBBE-2010-4 The objective is to identify the main **driving factors for food choice** and eating habits (including genomics and brain functions). Research will help **understanding discrepancies between actual versus optimal dietary behaviour**. It should also develop **strategies to induce behavioural changes** and facilitate consumers' choice for a healthy diet. Cross-cultural and sub-population group differences and **interactions with other life style factors such as physical activity** should also be considered taking, where applicable, existing **longitudinal studies** into account. **Methods for communication and dissemination** based on the developed strategies should be set up **to reach the consumers, in particular children, adolescents, and their parents**. A cross-disciplinary approach should be encouraged. Where appropriate, gender issues should be considered.

ifamily

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SEVENTH FRAMEWORK PROGRAMME

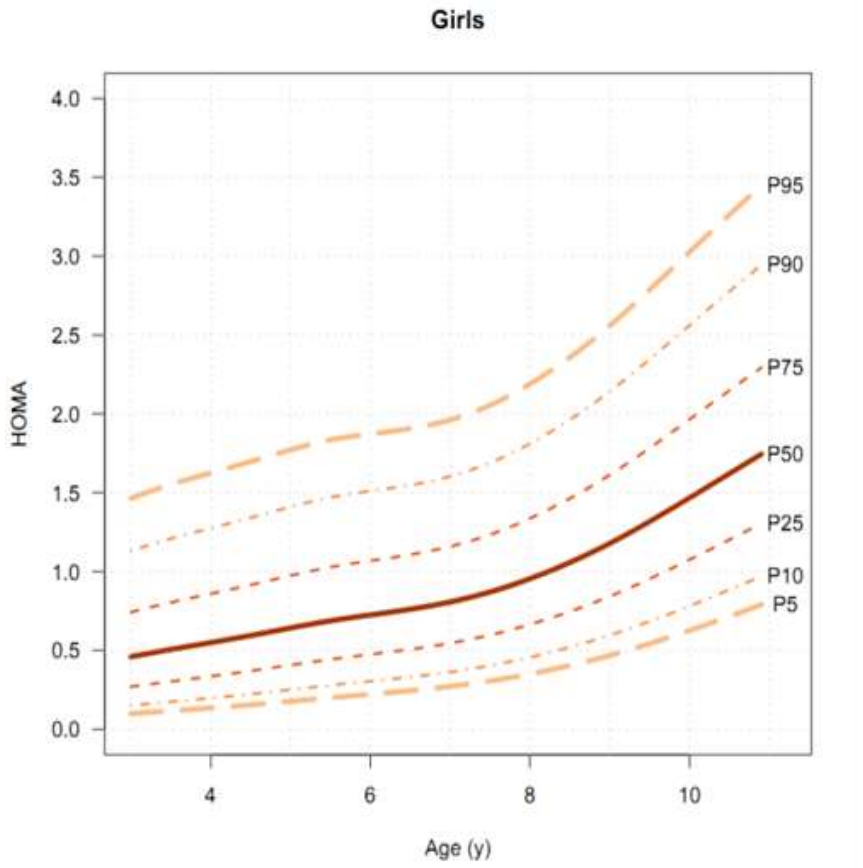
FP7 Work Programme 2010

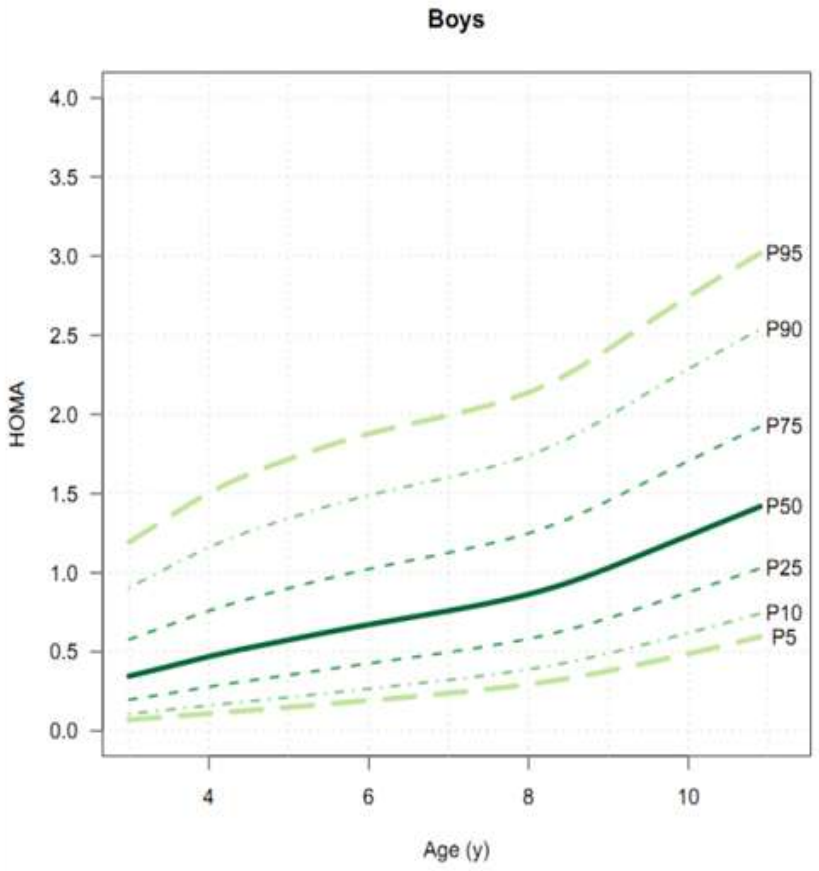
Theme 2 Food, Agriculture and Fisheries, and Biotechnology (29 July 2009)

Funding scheme: Collaborative Project (large-scale integrating project). The requested European Community contribution shall not exceed EUR 9,000,000.

Expected impact: It is expected that the results will help to better **understand (un-)healthy food choice through identification of main determinants and triggers** and to facilitate a healthy food choice for European consumers. Methods for a better communication and dissemination strategy in Europe that will induce healthier lifestyles in children, adolescents, and adults. Increased **collaboration between different scientific fields and contribution to** the successful achievements of the **EU Platform on Diet, Physical Activity and Health**.

Percentiles of HOMA-IR of normal weight children of the IDEFICS cohort (2007-2010)





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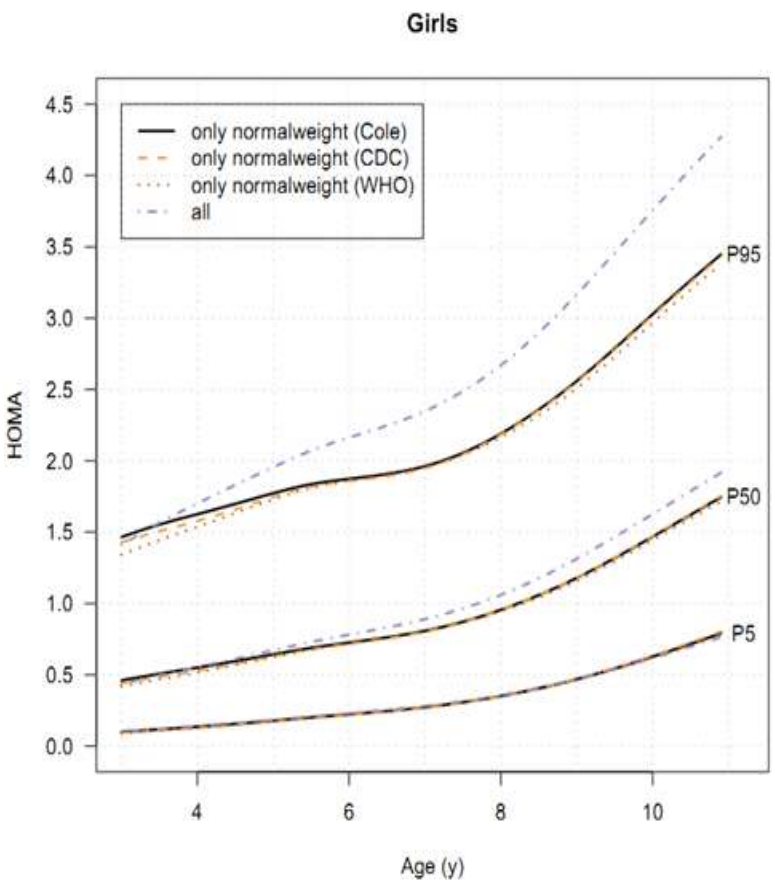
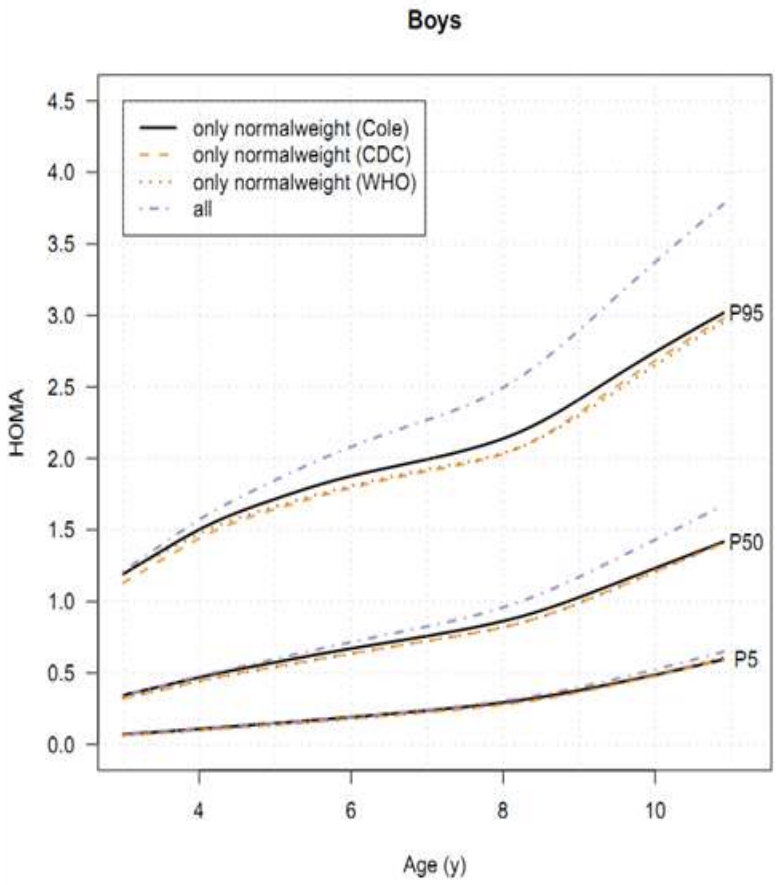
Percentiles of fasting HOMA-IR according to different inclusion criteria





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