EC project Pro Children - identification of fruit and vegetables intake determinants and the development of appropriate strategies to promote such intake among school children and parents across Europe.

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F&V consumption in Europe (g/pc/day)

Source: DAFNE Data Food Networking 2006- DG SANCO
Fruit, Vegetables and Disease Prevention

- Low fruit and vegetable intake is among the top 10 selected risk factors for global mortality.
- Low intake of fruits and vegetables is estimated to cause about 19% of gastrointestinal cancer, about 31% of ischaemic heart disease and 11% of stroke worldwide.
- 2.7 million deaths are attributable to low fruit and vegetable intake: more than four fifths from heart diseases.
- Childhood obesity: 22 million children in the EU estimated to be overweight (IOTF).
Promotion of healthy eating: children and adolescents

- Increasingly important in public health as the prevalence of overweight in children rise
- Understanding determinant factors
  - Individual level factors
  - Environmental factors
- Expected importance of environment for obesity related behaviours in children and adolescents
- The school setting:
  - Population groups: children, parents, teachers
  - Most children attend to school
  - Spend 6-7 hours 5 days/week; 9 months/year
Pro Children


University of Oslo (Coordinador)
Unidad de Nutrición Comunitaria
Ayuntamiento de Bilbao
University Hospital Reykjavík
University of Copenhagen
Universidade do Porto
Universität Wien
Royal Veterinary and Agricultural University Denmark
Universiteit Rotterdam
Karolinska Institutet Stockholm
Universiteit Gent

EU RTF Project QLK1-2001-547
Pro Children: Aims

- To assess fruit and vegetable consumption in European schoolchildren and their parents, as well as determinants of the children’s consumption patterns.
- To develop and test strategies, applicable across Europe, for promoting consumption of fruits and vegetables among schoolchildren and their parents.
Percentage of individuals consuming **fruit ≥ 1 portion/day.** Pro Children, school children 11-12 yr


N=13924
Percentage of individuals consuming **vegetables ≥ 1 portion/day**. Pro Children, school children 11-12 yr


N=13924
Frequency of consumption of fruit. Mothers Pro Children

Frequency of consumption of vegetables. Mothers Pro Children

Qualitative Exploration of determinants of Fruit and Vegetable Intake among 10-11 yr-Old children

**Personal Factors**
- Health Beliefs
- Taste Preferences
- Knowledge
- Awareness
- Personal Barriers

**Factors Related to the Home Environment**
- Family Influences
- Availability and Accessibility
- Food Rules
- Encouragement

**Factors related to the school environment**
- Availability
- Peer Influences
- Social Norms

Pro Children: literature review. Potential determinants of fruit and vegetable intake in children and adolescents

Sociodemographic
- Gender
- Age
- SES
- Urbanization
- Ethnicity

Personal factors:
- Preferences
- Knowledge
- Attitudes
- Intentions
- Self efficacy
- Subjective norms
- Outcome expectancies

Family related factors
- Parental intake
- Home availability
- Access
- Family structure
- Family size
- Family meals
- Parenting styles
- Parental support

Friends related factors

School related factors

TV watching

Eating fast food

Theoretical Model applied to children consumption of fruit and vegetables: Pro Children Project

Pro Children intervention: Is it required?

- Fruit and vegetable intake is too low among European children
- Pro Children consortium: aimed to initiate, develop, implement and evaluate school-based fruit and vegetable promotion actions among primary school children aged 10-13 in different European countries: To develop an evidence-based and theory-driven intervention package that is applicable in different European countries.
## Identified changeable important determinants of fruit and vegetable consumption in Pro Children intervention

<table>
<thead>
<tr>
<th>Determinants</th>
<th>Personal</th>
<th>Social</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of importance of fruit and vegetable intake for health and well-being</td>
<td>Parental facilitation and direct encouragement</td>
<td>Availability and accessibility of fruit and vegetable at home</td>
<td></td>
</tr>
<tr>
<td>Positive taste preferences for different fruits and vegetables</td>
<td>Parental modelling behaviour</td>
<td>Availability and accessibility of fruit and vegetable in the school</td>
<td></td>
</tr>
<tr>
<td>Awareness of own fruit and vegetable intake</td>
<td>Peer modelling behaviour</td>
<td>A fruit and vegetable promotion school environment</td>
<td></td>
</tr>
<tr>
<td>Awareness of recommended intake levels</td>
<td>Teacher support</td>
<td>Neighbourhood support</td>
<td></td>
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<tr>
<td>Self-efficacy and skills for asking for fruit and vegetable</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Self-efficacy and skills for preparing fruit and vegetable</td>
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<tr>
<td>Self-efficacy and skills for obtaining fruit and vegetable</td>
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<tr>
<td>Self-efficacy and skills for keeping fruit and vegetable fresh</td>
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<tr>
<td>Familiarity with different fruits and vegetables</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance objectives</th>
<th>Personal determinants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Awareness</td>
</tr>
<tr>
<td>To assess adequacy of one’s own current fruit and vegetable intake</td>
<td>Children are aware of importance of fruit and vegetable intake for health and well-being</td>
</tr>
<tr>
<td></td>
<td>Children are aware of recommended intake levels</td>
</tr>
<tr>
<td></td>
<td>Children know what is a portion of fruit and a portion of vegetables</td>
</tr>
<tr>
<td></td>
<td>Children know what a fruit juice is and what is not</td>
</tr>
<tr>
<td></td>
<td>Children are aware of own intake</td>
</tr>
</tbody>
</table>
# Selected educational strategies related to learning objectives and modifiable determinants in Pro Children intervention

<table>
<thead>
<tr>
<th>Learning objective</th>
<th>Availability</th>
<th>Awareness</th>
<th>Preferences</th>
<th>Peer influences</th>
<th>Parental influences</th>
<th>Skills: Prepare Ask/Obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children are aware of importance of fruit and vegetable intake for health and well-being</td>
<td></td>
<td>Education-worksheet guided activity</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Children know recommendation</td>
<td></td>
<td>CT*-feedback</td>
<td></td>
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</tr>
<tr>
<td>Children know what a fruit juice is and what is not</td>
<td></td>
<td>Education-worksheet guided activity</td>
<td>Taste-testing</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>activity at school</td>
<td></td>
<td></td>
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<tr>
<td>Fruit and vegetable is an issue for children</td>
<td></td>
<td>Education-worksheet on label reading</td>
<td></td>
<td>Web-based</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>international</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>discussion forum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children find fruit and vegetable at school</td>
<td>School fruit (fruit break)</td>
<td></td>
<td>Eat fruit and vegetable together in class</td>
<td>Parents give fruit and vegetable to children to bring to school</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CT: Computer tailoring
Pro Children: Intervention

School-based Intervention program

School

Classroom
Out-of-classroom

Worksheets
Educational Activities
Computer
Tailoring
Web site

Whole School

School meals

Family

Worksheets
Newsletters
School Events
Computer tailoring

Community

School Health
Mass Media
Grocery stores
Estimados padres/madres,
Nuevamente nos ponemos en contacto con Uds. en relación con el proyecto Pro Children en el que participa su hijo/a.
Esta vez la actividad que proponemos a su hijo/a requiere que le anime y le recuerde algunas cosas. En clase, junto con su profesor/a y sus compañeros/as ha decidido qué va a hacer a lo largo de la semana que viene para comer más frutas y verduras. Ya se ha hecho su plan. Ha pensado también algunas cosas concretas que va a hacer.
Le pedimos que comente con su hijo/a en casa estos propósitos y que le ayude a conseguirlo, por ejemplo recordándole si ya ha cogido la fruta para llevar al colegio, o la estrategia que se haya trazado.
Queremos plantearlo como un pequeño juego que resulte una experiencia atractiva para los chicos/as. Se trata de intentar un pequeño reto a lo largo de una semana.
Muchas gracias por su ayuda.
La Comisión Escolar de Proyectos Saludables Pro Children.

“Volcán” from San Inazio school wins Pro Children recipe competition
30 schools from Norway, The Netherlands and Spain took part in the international recipe contest using fruits and vegetables

Last April 14th after long discussions, the international Pro Children jury decided in Rotterdam the winning recipes of the fruit and vegetable recipe competition. “Kristoffers Wok” from Oslo, “Pizza cauliflower” from Rotterdam and “Volcano” from Bilbao were the winners.
6 recipes from each country, 3 fruit recipes and 3 vegetable ones, were nominated for the final voting among more than 100 hundred submitted. Prizes will be delivered to winning schools in June.

In the picture one of the selected recipes, “Auergine Jamaican style” from Uribarri school.

More info on page 3.
International Recipe Competition

Etu listo, badago gure kremasko kuía jateko!!

ERREZETA LIBURUA
FRUTAK ETA BARAZKIAK
LIBRO DE RECETAS
FRUTAS Y VERDURAS
School fruit break
Bilbao
Study design

- Cluster randomised trial

<table>
<thead>
<tr>
<th>Intervention group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 schools (n=1115)</td>
<td>30 schools (n=991)</td>
</tr>
<tr>
<td>Norway: 9 schools (n=337)</td>
<td>Norway: 9 schools (n=390)</td>
</tr>
<tr>
<td>The Netherlands: 12 schools (n=410)</td>
<td>The Netherlands: 12 schools (n=325)</td>
</tr>
<tr>
<td>Spain: 11 schools (n=368)</td>
<td>Spain: 9 schools (n=276)</td>
</tr>
</tbody>
</table>
Pro Children: changes in total fruit and vegetables intake among intervention and control schools

<table>
<thead>
<tr>
<th>Total Fruit &amp; Vegetables intake</th>
<th>Total Fruit intake</th>
<th>Total Vegetables intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
</tr>
<tr>
<td>BL, baseline; FU 1, first follow-up; FU 2, second follow-up</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** Intervention effect was significant (P<0.05)

Knowledge score
Proportion who knows recommendations

Preferences fruit and vegetables

Perceived availability at school

### Project appreciation scores by children, teacher referred implementation and parental involvement

<table>
<thead>
<tr>
<th>Country</th>
<th>Children project appreciation</th>
<th>Degree of implementation</th>
<th>Parental involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean (SD)</td>
<td>n</td>
</tr>
<tr>
<td>Total</td>
<td>842</td>
<td>2.3 (0.5)**</td>
<td>818</td>
</tr>
<tr>
<td>Norway</td>
<td>240</td>
<td>2.4 (0.5)</td>
<td>225</td>
</tr>
<tr>
<td>Spain</td>
<td>297</td>
<td>2.3 (0.4)</td>
<td>320</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>305</td>
<td>2.2 (0.5)</td>
<td>273</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>380</td>
<td>2.3 (0.5)</td>
<td>369</td>
</tr>
<tr>
<td>Girls</td>
<td>462</td>
<td>2.3 (0.4)</td>
<td>449</td>
</tr>
</tbody>
</table>

** p<0.001; *p< 0.05

Conclusions

- Consumption of F&V in European school children is below recommended intake levels in a large proportion of this population group.
- Intake below desirable levels is more frequent among boys.
- The Pro Children intervention is a promising means to promote European schoolchildren’s fruit and vegetable intakes: school-based, multi-component, involving parents, increasing availability and access to F&V.
- Family support and involvement is important: encourage to eat F&V.
- Strategies should be implemented over time with adequate duration.
- More research is needed to find the barriers for implementation and solutions to improve it, particularly family support.
PRO CHILDREN

WY DOEN MEE!  WE TAKE PART!  VI ER MIDI!

NOSOTROS PARTICIPAMOS!

GUK PARTE HARTZEN DUGU!
This paper was produced for a meeting organized by Health & Consumers DG and represents the views of its author on the subject. These views have not been adopted or in any way approved by the Commission and should not be relied upon as a statement of the Commission’s or Health & Consumers DG’s views. The European Commission does not guarantee the accuracy of the data included in this paper, nor does it accept responsibility for any use made thereof.