School and community interventions for preventing obesity and NCDs in Europe: ToyBox-Study & Feel4Diabetes-study

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Tracking of childhood overweight and obesity into adulthood

The Bogalusa Heart Study
Follow-up: 17.6 years

Freedman et al.; Pediatrics 2005
Prevalence of iron deficiency by weight status in primary schoolchildren in Greece

What is the prevalence of overweight/obesity at preschool age in Europe?

How can we prevent early childhood overweight/obesity?

EU funded project: Number 245200, FP7-KBBE-2009-3)
Prevalence of **overweight/obesity** among preschool children in Europe

![Bar chart showing the prevalence of overweight and obesity in various European countries.](image)

<table>
<thead>
<tr>
<th>Country</th>
<th>Overweight</th>
<th>Obesity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td>14.9%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Spain</td>
<td>12%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>11.5%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Poland</td>
<td>10.4%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Belgium</td>
<td>9.4%</td>
<td>2%</td>
</tr>
<tr>
<td>Germany</td>
<td>8.6%</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

P < 0.001

Prevalence of **overweight/obesity** among preschool children in Europe by socioeconomic status

<table>
<thead>
<tr>
<th></th>
<th>Low SES</th>
<th>Mid/High SES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South</strong> (Greece, Spain)</td>
<td>14.5%</td>
<td>12.7%</td>
</tr>
<tr>
<td></td>
<td>9.3%</td>
<td>7.2%</td>
</tr>
<tr>
<td><strong>East</strong> (Bulgaria, Poland)</td>
<td>3.5%</td>
<td>3.1%</td>
</tr>
<tr>
<td></td>
<td>10.9%</td>
<td>10.0%</td>
</tr>
<tr>
<td><strong>Central/North</strong> (Belgium, Germany)</td>
<td>2.0%</td>
<td>1.6%</td>
</tr>
<tr>
<td></td>
<td>8.9%</td>
<td>8.1%</td>
</tr>
</tbody>
</table>

$P = 0.040$

What is the prevalence of overweight/obesity at preschool age in Europe?

How can we prevent early childhood overweight/obesity?

EU funded project: Number 245200, FP7-KBBE-2009-3
What is the prevalence of overweight/obesity at preschool age in Europe?

How can we prevent early childhood overweight/obesity?

*By developing and implementing a kindergarten-based, family-involved intervention*

EU funded project: Number 245200, FP7-KBBE-2009-3)
ToyBox-study

2010

• Systematic reviews
• Secondary analysis
• Focus groups

Key-behaviours & their determinants

2011

2012-2013

2014

Targeted behaviours
• Water consumption
  • Snacking
• Physical activity
• Sedentary behaviour

Aiming to:
✓ Change kindergarten environment
✓ Implement the behaviours
✓ Target & involve parents via newsletters/daily activities
Training of teachers
1st Behaviour: Water consumption

Change of kindergarten environment

Implementation of behaviour
2nd Behaviour: Snacking

Change of kindergarten environment

Implementation of behaviour
3rd Behaviour: Physical activity

Change of kindergarten environment

Implementation of behaviour
4th Behaviour: Sedentary behaviour

Change of kindergarten environment

Implementation of behaviour
Intervention at home

- **9 Newsletters**
- **8 Tip-cards**
- **4 Posters**
ToyBox Programme was implemented in 6 countries during school year 2012-2013

ToyBox Programme was implemented:
• by more than 700 kindergarten teachers
• in 309 kindergartens
• reaching more than 17,000 children and their families
ToyBox Programme was implemented in 6 countries during school year 2012-2013

<table>
<thead>
<tr>
<th>Country</th>
<th>Kindergartens</th>
<th>Children/Parents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>26</td>
<td>1032</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>19</td>
<td>792</td>
</tr>
<tr>
<td>Germany</td>
<td>55</td>
<td>954</td>
</tr>
<tr>
<td>Greece</td>
<td>92</td>
<td>854</td>
</tr>
<tr>
<td>Poland</td>
<td>49</td>
<td>1065</td>
</tr>
<tr>
<td>Spain</td>
<td>30</td>
<td>853</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>271</strong></td>
<td><strong>5550</strong></td>
</tr>
</tbody>
</table>

April 2010  |  2011  |  2012  |  2013  |  2014  |
Summary of findings after one year of intervention:

Positive changes were found for IG vs. CG for:

- Children’s screen time
- Children’s water consumption
- Children’s and parents’ sweet consumption
- Children’s and parents’ snack choices


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% overweight/ obesity from baseline to follow up:

- No changes between IG vs. CG
Factors associated with change observed in preschool children’s BMI over the 1-year intervention period

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>B</th>
<th>95 % C.I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children’s age at follow-up (years)</td>
<td>0.134</td>
<td>0.081</td>
</tr>
<tr>
<td>Sex (Girls vs. Boys)</td>
<td>-0.064</td>
<td>-0.106 -0.022</td>
</tr>
<tr>
<td>Children’s BMI at baseline (kg*m⁻²)</td>
<td>-0.011</td>
<td>-0.028 0.006</td>
</tr>
<tr>
<td>Treatment arm (Intervention vs. Control)</td>
<td>-0.033</td>
<td>-0.128 0.061</td>
</tr>
<tr>
<td>Region (Belgium/Germany vs. Greece/Spain)</td>
<td>-0.320</td>
<td>-0.227 -0.023</td>
</tr>
<tr>
<td>Region (Bulgaria and Poland vs. Greece/Spain)</td>
<td>-0.125</td>
<td>-0.423 -0.217</td>
</tr>
<tr>
<td>Maternal misperception of child’s weight status (Underestimation vs. correct estimation)</td>
<td>0.390</td>
<td>0.173 0.607</td>
</tr>
<tr>
<td>Maternal pre-pregnancy BMI (Overweight/obese vs. Normal-weight)</td>
<td>0.181</td>
<td>0.123 0.238</td>
</tr>
<tr>
<td>Paternal BMI (Overweight/obese vs. Normal-weight)</td>
<td>0.082</td>
<td>0.038 0.127</td>
</tr>
</tbody>
</table>

†: Three level logistic model adjusting for the random effects of socio-economic status and school.

School-based, family-involved intervention
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School-based, family-involved intervention

Targeting High Risk Families
Feel4Diabetes-study was implemented in 6 countries during school years 2016-2017 & 2017-2018

Feel4Diabetes-study was implemented:
• in 221 schools
• reaching more than 30,309 children and their families

EU-funded project: Horizon 2020 / Grant agreement n° 643708

For evaluation purposes data obtained at: Spring 2016, 2017 & 2018

<table>
<thead>
<tr>
<th>Country</th>
<th>Schools</th>
<th>Families</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>60</td>
<td>1278</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>20</td>
<td>2196</td>
</tr>
<tr>
<td>Finland</td>
<td>30</td>
<td>1305</td>
</tr>
<tr>
<td>Greece</td>
<td>56</td>
<td>1744</td>
</tr>
<tr>
<td>Hungary</td>
<td>14</td>
<td>1309</td>
</tr>
<tr>
<td>Spain</td>
<td>41</td>
<td>1326</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>221</strong></td>
<td><strong>9,158</strong></td>
</tr>
</tbody>
</table>

1st year Intervention results (IG vs. CG):

School & Community-based component: 6 countries
(n= 9,158 families)

Favorable changes for parents:

↑ Physical Activity
↓ Screentime
↓ Father’s BMI

Favorable changes for children:

↑ Fruits & Vegetables
↓ Sweets & Salty snacks
↑ Physical Activity
1st year Intervention results (IG vs. CG):

School & Community-based component: 6 countries (n= 9,158 families)

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- ↑ Physical Activity
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Favorable changes for children:
- ↑ Fruits & Vegetables
- ↓ Sweets & Salty snacks
- ↑ Physical Activity

High-Risk Families component: for Greece (n=432 families)

Favorable changes for parents:
- ↓ Waist circumference
- ↓ Total cholesterol
- 35% of the pre-diabetic parents turned to normal glucose levels

Favorable changes for children:
- ↓ BMI
- ↓ BMI-z scores in girls
ToyBox is scaling up around the globe: www.toybox-study.eu
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**feel4diabetes-study** is still on going: [www.feel4diabetes-study.eu](http://www.feel4diabetes-study.eu)
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Yannis Manios: manios@hua.gr

THANK YOU!