

NEWSLETTER

NEWSLETTER N°07 Autumn 2013

Highlights :

HabEat project Determining factors and critical periods in food Habit formation and breaking in Early childhood: a multidisciplinary approach

HabEat stakeholder workshop n°3 summary: 13th June 2013 in Warsaw, Poland

HabEat publication

HabEat at external events

HabEat-VIVA workshop: 19th September 2013 in Granada, Spain

Final Symposium announcement: 31st March-1st April 2014 Dijon, France



HabEat stakeholder workshop n°3

After the first and the second stakeholder workshops which were respectively held on 3rd April 2012 at the University of Leeds (UK) and on 27th September 2012 at the University of Porto, Medical School (Portugal), we were welcomed on 13th June 2013 at the Warsaw University of Life Sciences, Faculty of Human Nutrition and Consumer Science for the third stakeholder workshop." Prof. Krystyna Gutkowska, Dean of the Faculty of Human Nutrition and Consumer Science and Prof. Nina Baryłko-Pikielna gave the welcome to participants and presented the Faculty.



Prof. Krystyna Gutkowska

"The Faculty of Human Nutrition and Consumer Sciences (formerly the Faculty of Human Nutrition and Rural Home Economics) was founded in 1977. Nowadays, the Faculty has around 120 staff members and enrolls more than 1000 students (full-time, part-time, evening and postgraduate courses). The Faculty develops educational and research activities related to human nutrition and its impact on health and quality of life, evaluation of food products from the point of view of health, consumer needs and behaviour as well as food services, household economics and the functioning of the food market in Poland and other EU countries"

The morning session, devoted to presentations by the invited speaker Dr Piotr Socha from The Children's Memorial Health Institute and by HabEat partners, was open to stakeholders. There were 82 attendees, and in particular a large number of health professionals and representatives from the baby food industry (See figure 1a). The attendees came from 9 countries with a large proportion of Polish (62%) (See figure 1b). The afternoon session was devoted to exchanges and thus was open to a smaller audience.



Figure 1a: Participants per sector

1b: Participants per country

After my overview presentation of HabEat, I handed over to the speakers. Our invited speaker, Dr Piotr Socha from The Children's Memorial Health Institute focused his talk on the prevention and treatment of feeding disorders (see page 3). Dr Gertrude Zeinstra, Dr Annemarie Olsen and Dr Vassiliki Costarelli's talks focused on different strategies to increase vegetable intake (see pages 4-6). Dr Carla Lopes presented "what can we learn from cohort findings in HabEat?" (see pages 7-8). Dr Sophie Nicklaus and Dr Sandrine Monnery-Patris presentations focused on the adjustment of energy intake in children: in relation to their weight status and with parental feeding practices (see pages 9-10). The HabEat speakers concluded their talks by presenting key findings from previous studies and from HabEat, each finding being related to a practical implication. The three series of implications were discussed during the afternoon session. The key points of discussion are presented in this newsletter (see pages 11-16). These exchanges highlight the cultural differences and the fact, that even if the key messages should be the same for all countries, some messages should be presented differently according to the cultural context. This will be taken on board when drawing up guidelines resulting from HabEat studies.

EWSLETTER



The third HabEat stakeholder workshop in Warsaw



'A nice evening break in the wonderful city of Warsaw after 3 days of fruitful and busy meetings'

Dr Sylvie Issanchou HabEat Coordinator

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Dr Piotr Socha p.socha@czd.pl

Feeding disorders - Prevention and treatment (A Polish perspective)

Anna Rybak, Anna Stolarczyk, Małgorzata Matuszczyk, Ewa Winnicka-Makulec, Kamila Zych, Piotr Socha - The Children's Memorial Health Institute, Warsaw, Poland

Feeding disorders in early infancy are mainly due to mistakes in maternal feeding practices. We performed recently an observational study in a randomly selected population of 317 Polish infants where we asked mothers about feeding practices. The mothers generally did not adhere to the guidelines, although most of them are convinced that they have appropriate knowledge of the recommendations.

There are numerous inadequate practices in infant feeding, which can lead to feeding disorders later in life. The major one is offering too many meals to children (exceeding 6x/day in 73% infants at the age of 6 m. and 66% at the age of 12 m.), of which >20% in both age groups eat meals 10 times and more. Infants get small snacks between meals (25% at 6m and 75% at 12 m) and drink too much juice and instant tea (sweet taste). Only 10% of infants drink spring water. Complementary foods and spoon feeding were introduced too late in more that 20-30% of the groups studied.

Another problem is the inability of the medical services to support mothers of children with neurologic disorders. We performed a survey among medical centers in Poland to see how clinics deal with children with feeding disorders; we discovered that the majority of children with malnutrition at time of referral to gastrological or neurological clinics present feeding problems. We started a program of workshops to educate specialists (medical doctors, dieticians, psychologists, speech specialists) around Poland to improve care of feeding disorders. We have tried to put together teams of specialists from different areas of Poland to ensure better provision of medical services and consultations.

According to the literature, over 25% of children under 3 years of age and up to 90% of children with neurological disabilities¹ suffer from feeding disorders. In our Institute we have been working as a feeding team, comprising a pediatrician, a dietician, a speech therapist and a psychologist, since 2009. Since then, we have hospitalized over 380 children with feeding disorders caused by a variety of factors. Still, the majority of patients with feeding problems remain under the care of our outpatient department. At the moment we are the only feeding team in Poland offering multidisciplinary services.

The diet of children with feeding disorders is usually not well-balanced. The main problems are an increased number of meals, frequent snacking and sweet liquids given between meals, too long meals, serving big portions and very selected products leading to exclusions of some groups of products like vegetables. The patients present malnutrition or overweight. The role of nutritionist is important both in identification and treatment of feeding disorders. She/he is responsible for analysing the current diet, identifying nutritional mistakes and finally modifying the child's diet in order to correct their nutritional status and form better eating habits.

Our experience shows that children with sensory integration disorders often have problems in developing eating skills. Many of them have a limited diet due to problems with chewing (they eat only pulp or liquid products) or/and abnormal motor skills when swallowing. Some of them do not tolerate wet food or lumps, they may present gagging reflex during eating. Such problems usually occur among children born prematurely. Premature babies need special feeding care when oral feeding is introduced instead of the nasogastric tube feeding. Errors in this process cause long term consequences.

Such feeding problems as well as information on nutritional habits and major mistakes in nutrition of infants in Poland have forced us to move our attention to the education of parents through media as well as the wider involvement of health care professionals and governmental bodies. Prevention of feeding problems must be regarded as a key concern.

Reference:

¹ Bernard-Bonnin AC: Feeding problems of infants and toddlers. Can Fam Physician. 2006 Oct; 52(10):1247-51.



Strategies to increase vegetable intake

Dr Gertrude G. Zeinstra, WUR Food & Biobased Research, Wageningen, The Netherlands Dr Annemarie Olsen, University of Copenhagen, Denmark Dr Vassiliki Costarelli, Harokopio University of Athens, Greece

Despite the health benefits, children's vegetable consumption is below the recommended intake across Europe (Fagt et al, 2007; Ocké et al, 2008; Yngve et al, 2005). Previous research has shown that it is not easy to increase children's vegetable consumption. Since neophobia (reluctance to taste or eat novel foods) and pickiness (the rejection of a substantial number of familiar foods) peaks between the age of two and five years (Cashdan, 1998; Pliner, 2006), it is especially challenging to increase vegetable consumption around this age range.

In Work Package 3 of the HabEat project, several studies were executed among three- to six-year-old children with the aim to increase their vegetable consumption. Different strategies were applied in different countries: repeated exposure, imitation of role models, freedom of choice, and participation. All studies were executed in real-life settings, such as nurseries, primary schools or at home.

Repeated exposure and sensory variation

Repeated exposure (~repeated tasting) is assumed to be an effective mechanism to increase children's intake of vegetables. It is not known whether variations in the sensory aspects of vegetables do influence this. Therefore, this strategy was tested in two experiments, one conducted in the Netherlands, the other in Denmark.

In the Netherlands, 4- to 6-year old children received two shapes of raw carrots: sticks and slices (each 50 grams). These carrots were offered twice a week during the children's habitual morning snack moment at school, for a total of 10 times (intervention group). A control group received the carrots only three times during the experiment. In contrast to what was expected, no effect of repeated exposure was observed during the intervention period: children's carrot intake did not increase over the ten exposure sessions. However, the children consumed on average 32 grams (intervention) and 47 grams (control) of raw carrots during the exposure period. When we keep in mind that Dutch children eat about 45 grams of vegetables at home (Ocké et al, 2008), this quantity could be a valuable addition to their current intake. In six out of ten sessions, the children ate more of the slices compared to the sticks, indicating that the children had a slight preference for the slices.

In Denmark, 3- to 5-year old children were exposed seven times to raw Chinese radish as an afternoon snack. Chinese radish was served grated, in triangles or in sticks (see photo 1). So, there were three experimental groups of children and a control group who did not participate in the exposure sessions. All groups participated in pre- and post-measurements where the children received Chinese radish in slices and liking, intake and familiarity was measured. In this experiment, a repeated exposure effect was observed: children's intake of Chinese radish increased steadily over the seven exposures. When looking at the pre- and post-tests, the observed increases were in the range of 100-500%, starting from about 20 grams at pre-test to 60-100 grams during post-test. Highest increases in intake were seen for the groups that received sticks and triangles during the exposure sessions, indicating that intake was influenced by the shape by which the vegetables were served during the pre- and post-tests. So this study showed a clear learning effect, and follow-up visits 3 and 6 months after the intervention revealed long-lasting effects regarding intake and liking.

So to conclude, the repeated exposure study with raw carrots in The Netherlands did not show a repeated exposure effect with ten exposure sessions among 4- to 6-year-old children, whereas the Danish study did show a repeated exposure effect with Chinese radish among 3- to 5-year-old children. Several factors may be responsible for the different results, such as cultural differences in consumption of raw vegetables, time of eating the raw vegetables and familiarity with the presented vegetable. A carrot is relatively familiar to Dutch children -although less familiar in its raw form and at school-, whereas the Chinese radish was not familiar to the Danish children. So, these results suggest that repeated exposure is effective for unfamiliar vegetable, but not so effective for a vegetable that children already are familiar with (although in a different form). Both experiments showed that serving style of vegetables influences children's liking, and this may be a strategy to use in further research.



Photo 1: Chinese radish, the stimuli used in the repeated exposure study in Denmark



Imitation studies

From the literature, it is known that children learn by watching and imitating other people's behaviour. It is not yet known whether this strategy is effective for increasing children's vegetable intake. Therefore, imitation studies were conducted in the Netherlands (primary school) and Greece (nursery). In these studies, an attractive (TV) character -appropriate for this age group- and the teacher were applied as role models; they ate vegetables in an enthusiastic manner. There were three groups in the study. One group of children was exposed to the model eating raw carrots enthusiastically, whereas they did not receive the carrots themselves, this activity was called positive restriction. In another group the children and the model ate the carrots together. These two groups participated in eight sessions of convivial eating (2x per week). The third group was a control group; these children never ate carrots with the role model. The children also participated in different choice tests, where the children could choose from four which vegetable they wanted to eat: cucumber, tomato, red bell pepper and carrot. Their choice and intake were measured. These choice tests were included to get an indication of the children's preference for raw carrots. Figure 1 shows the design of the study.



Figure 1: Design of the imitation studies within HabEat Work Package 3

In contrast to what was expected, intake did not increase over the eight convivial eating sessions. The Dutch children consumed on average between 20 and 35 grams of raw carrots during the convivial eating sessions, and this was 20 to 50 grams for the Greek children. It was remarkable that children's intake was higher during the choice tests: 60-80 grams for the Dutch children and 45 to 85 grams for the Greek children. These studies indicate that imitation strategies with a relatively familiar vegetable do not result in a short-term increase in vegetable intake among 3- to 6-year old children, but suggest that choice-offering may have a positive influence on children's vegetable consumption. Longer-term measurements might provide new insights.

Freedom of choice

The effect of freedom of choice has hardly been studied in relation to children's food intake. Since choice is related to the need for autonomy, this may have a positive influence on children's vegetable eating behaviour. The few studies that have been executed show inconsistent results (Rohlfs-Dominguez, 2013; Zeinstra, 2010). Therefore, the effect of freedom of choice on vegetable intake was tested in Denmark and Greece in nurseries, and at home in the Netherlands. In the Greek and Danish study, children were offered vegetables in sessions with or without free choice. During the choice sessions, children could choose themselves which vegetable(s) they wanted to eat. The test vegetables were selected based on the fact that they were of fairly equal liking and equal familiarity to the children. In Denmark, sugar snaps, baby maize and snack carrots were used as stimuli. In Greece, tomato, cucumber and carrot were used (all in raw form). The results of the Danish study are somewhat contradictory with positive effects on vegetable intake of free choice when comparing to no choice sessions across stimuli (over all vegetables, i.e. not taking type of vegetable into account), and none or even negative effects when intake is compared in a stimulus specific manner between the free choice and no choice sessions (i.e. per vegetable type). The Greek results indicate that freedom of choice condition leads to increased intake of vegetables in total; however, further analysis is needed to evaluate the strength of this finding.

Strategies to increase vegetable intake



Strategies to increase vegetable intake



Photo 2: One boy participating in the choice study in The Netherlands, picking up his vegetables for the coming week

In the choice study in the Netherlands, children received vegetables at home as part of their normal dinner. To test the effect of choice-offering as a strategy to increase vegetable intake, two groups were used: one group (no choice group-control group) received one type of vegetable during dinner time, while in the other group (choice group), children received two vegetables at dinner time. So, these children were able to choose between two vegetables or could eat both vegetables during dinner. Six target vegetables were used in both groups: peas, carrots, broccoli, French beans and string beans. These chosen vegetables are the most common eaten vegetables in 2-5 year old Dutch children. Photo 2 shows a participant of this study. Results showed a positive trend of freedom of choice on vegetable intake when corrected for gender, age and vegetable liking prior to the intervention. These findings suggest that choice-offering can be an effective strategy for increasing vegetable intake in young children but it appears to be a 'conditional' effect. This means that this strategy may be effective only for a certain age group or children with initial low liking scores for vegetables.

So, taking these three studies together, the results point to a positive role for choice-offering, but further research is needed to substantiate these findings and get more insight into the groups of children that are most responsive to choice-offering.

Participation in vegetable preparation

Research indicates that involving children in the process of growing, preparing or cooking their own fruit and vegetables may be a useful approach to increase children's liking and intake of fruit and vegetables. This was further tested in the Restaurant of the Future in the Netherlands, with children aged 4 to 6 years. The intervention group participated in an interactive cooking session, where the children prepared boiled carrots with a chef. The control group participated in a book-reading activity that was not related to food. Vegetable intake was measured four times, during four different sessions: before the intervention, after the intervention and one and three months after the intervention. During these sessions, the children and one of their parents were offered a typical Dutch meal consisting of potatoes, vegetables and meat.

The results showed that participation in this interactive cooking session did not lead to an increased vegetable intake at dinner time. During all sessions, children's vegetable intake was around 50-55 grams, which is quite close to Dutch children's daily vegetable intake.

The studies within this Work Package confirm that encouraging vegetable intake among 3 to 6year-old children is a great challenge. In all studies, a large variation in eating patterns was observed. In addition, there was always group of non-eaters that consistently ate nothing or very little. This group was unresponsive to the tested strategies and alternative strategies might be necessary for this particular group of children. Further analyses are focused on parental and child characteristics, which were collected via questionnaires. These may help to explain the large differences in children's vegetable consumption. On the other hand, the studies show that increasing vegetable intake among children is possible. Repeated exposure to an unfamiliar vegetable seems very effective in increasing vegetable intake among 3-5-year-olds. In addition, choice-offering seems a strategy that has the potential to encourage vegetable consumption in some children, but this needs further research to be confirmed.

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What can we learn from cohort findings in HabEat?

Carla Lopes, University of Porto Medical School, Portugal

Cohort studies are ideal settings to assess the effect of exposures across the life span. HabEat brings together data from four European birth cohorts – ALSPAC (UK), EDEN (France), EUROPREVALL (Greece) and Generation XXI (Portugal), providing cross-cultural evidence on how perinatal and postnatal exposures influence eating behaviour, fruit and vegetables intake, and food variety of infants and pre-school children while allowing several confounding variables to be controlled for.

The foetal programing theory provides evidence that the intrauterine environment is a contributing factor to future health [1]. Birth weight has been associated with insulin levels and blood pressure, suggesting that a risk profile is established in early in life [2, 3]. Biological plausibility and knowledge of environmental influences support the argument that weight at birth, as a surrogate of the *in-utero* environment, might influence a child's eating behaviour and dietary intake, which in turn could lead to a negative health profile. Thus, we aimed to prospectively relate birth weight (standardized for gestational age) with feeding behaviours at different ages and across cohorts. From our data, parents of children born small for their gestational age reported more frequent eating difficulties and poor eating patterns (eating small quantities each meal or needing to be stimulated to eat), at early ages (4-6 months), but this effect was weakened at older ages. On the other hand, French children born large for their gestational age seem to be more neophobic to foods at 48-60 months. Eating difficulties and, to a lesser extent, food refusal/neophobia, as perceived by parents, were also related to lower fruit and vegetables intake at 48-60 months. As eating problems in infants are highly persistent throughout childhood [4] and have been found to increase the risk of other cognitive, behavioural, and psychosocial problems in general population samples [5], their early identification, followed by advice and support to parents may reduce perceived eating difficulties [6, 7], and potentially improve childhood growth and future health.

In many countries, fruit and vegetable intake, especially vegetables, remains below recommendations for young children [8-11]. A diet rich in fruit and vegetables in childhood has many beneficial effects on future health outcomes: for example, it was documented that children who eat more fruit and vegetables have lower blood pressure and a lower risk of stroke mortality in adult life [12, 13]. Previous studies have reported that early feeding practices may be related to fruit and vegetable intake in later childhood [14-16], but that the long-term effects of early parental feeding practices on later intake are not clearly established. Although discrepancies regarding early feeding practices were identified across the four European cohorts (with longer breastfeeding duration in Generation XXI and earlier introduction to complementary foods in ALSPAC), from our data, longer breastfeeding period appears to be consistently related to higher fruit and vegetables intake in young children. The association between longer breastfeeding and higher fruit and vegetable intake later in life is corroborated by previous studies [14]. A possible explanation for this is that familiarization of breastfed infants to flavours transmitted in breast milk from the mother diet leads to an increase in acceptance of the flavours of fruit and vegetables when they are offered to the infant [17]. Additionally, our results suggest that preschool children are not consuming as wide a variety of healthy foods as is recommended and that children who have never been breastfed or for a short period (equal to or less than 3 months) eat a lower variety of healthy foods. In the first months of life, breast milk carries a variety of flavours determined by the foods eaten by the mother; therefore, infants exposed to breast milk may show greater readiness to try new foods in the complementary feeding period and this may shape their food choices in later life [18].

Considering the importance of early critical windows, we hypothesized that earlier introduction to fruit and vegetable is related to higher fruit and vegetable intake and food variety later in life (see figure 2). These associations were weaker and less consistent across the cohorts. However, in UK children (ALSPAC) later introduction to vegetables (6 months or more) was associated with a lower vegetable intake at older ages and with a lower variety score at 2, 3 and 4 years compared to the introduction to vegetables between 4 and 5 months. Further analysis will be conducted to assess these effects on child's weight.







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What can we learn from cohort findings in HabEat?

Methodological constraints, cross cutting all cohorts, make the challenge of combining all these analyses even harder. We must be aware that these cohorts are on-going studies, not specifically designed to answer these objectives, with different assessment methods, follow-up age frames and sample sizes, which could hamper us from making robust comparisons across cohorts and ages. Nonetheless, cohort studies provide valuable evidence that early life exposures have an independent effect on a child's eating behaviour, fruit and vegetables intake and food variety during early childhood strengthening the determination of researchers, health professionals and stakeholders to promote healthy eating environments early in life.



Figure 2: Life course trajectories studied within the HabEat project, based on data from four European cohorts to identify 'windows' for intervention

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Adjustment of energy intake in children: relation to their weight status and to parental feeding practices

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The prevalence of obesity among children has reached dramatic levels in most developed countries. Some parental feeding practices may promote overeating in children, by triggering eating in the absence of physiological hunger, and by impairing an infant's response to internal states of hunger and satiation (DiSantis et al., 2011).

Food intake regulation involves adjusting energy intake to energy expenditure. It has been shown that infants have an innate ability to self-regulate energy intake (Fomon & al, 1974; Remy & al, 2013). However, this ability tends to decrease during the first years of life, as eating becomes more influenced by external cues such as palatability, portion size, routine, parental control and social context (Birch & Fisher, 2000; Rolls et al., 2000, Fox et al., 2006; Taveras et al., 2004; Savage et al., 2007). For instance, children may receive different injunctions about the way to feed themselves, which may tend to modify their self-regulated when eating a disliked food (Benton, 2004). Access to certain foods may be also restricted (Fisher & Birch, 2000; Birch et al., 2003), or the way they are fed may be manipulated (Ramsay et al., 2010). Here, the objective was to evaluate whether two components of children's eating behaviour, eating in the absence of hunger (EAH) and caloric compensation (CC), were likely to be influenced by parental feeding practices.

The objective of the first study conducted within the HabEat project was to examine in a French sample (n=793) the link between self-regulation in 1 to 5 year-olds, and certain parental practices, using a declarative approach (see figure 3). Two different child behaviours were investigated: 'EAH' (e.g., After my child has finished her/his meal, if sweets are available, my child will not eat / take a few sweets / eat a lot of sweets) and 'Poor CC' (e.g., If my child eats one hour before the meal, for example a bun or a muffin, during the meal she/he will eat the same amount / eat less).

My Child							
A)	For each sentence, tick your answer!	never	rarely	sometimes	often	always	Not applicable to my child (too young)
1	My child has a morning snack between breakfast and lunch						
2	My child asks for something to eat between meals						
3	As soon as s/he leaves school (nursery or childminder), my child asks for something to eat						
4	My child asks for something to eat after being physically active (walking, gymnastics)						
5	My child finishes everything on her/his plate (or his/her bottle/cup)						
6	My child has a big appetite						
7	My child eats between meals						
8	My child gets full before her/his meal is finished						
9	My child cannot finish her/his meal if s/he has had a snack just before						



The results reveal that EAH and Poor CC are two independent behaviours, impacted by different parental factors. More specifically, the use of instrumental practices such as 'food as reward' was positively linked to EAH, whereas the 'awareness/sensitivity of parents to child hunger and satiety cues' was negatively linked to EAH. 'Feeding on schedule' was negatively linked with poor CC whereas 'Flexibility' was positively associated with Poor CC. Moreover, the results indicated that the impact of Poor CC on child's BMI is higher than the impact of EAH (see Figure 4).





Adjustment of energy intake in children: relation to their weight status and to parental feeding practices The objective of the second study conducted with the HabEat project was to examine in a French sample (n=236) the links between self-regulation in 3 to 6 year-old children, evaluated by actual measurement of food intake in challenging eating situations, to define EAH and CC scores, and some maternal feeding practices (food as reward; emotional regulation; pressure; monitoring; child control; and restriction for weight, CFPQ, Musher-Eizenman & Holub, 2007) and eating behaviour (emotivity, externality, restriction, DEBQ, Van Strien et al., 1986) evaluated using a declarative approach. Children's food intake was measured during three identical lunch sessions, once a week at the school canteen (without their parents). The first lunch was a control session. Thirty minutes before the second lunch (CC condition), children were offered a preload (137 kcal). Ten minutes after the third lunch (EAH condition), children were exposed to a post-meal snack composed of palatable foods (430 kcal). The design is shown in figure 5.



Figure 5: Design of the experiment to evaluate children's ability to regulate their intake in two challenging eating situations.

On average children compensated half of the energy preload (CC condition) and ate about a quarter of the energy brought by their lunch at the post-meal snack (EAH condition) as shown in figure 6. CC and EAH scores were not correlated and did not vary with age or adiposity. Boys ate more in the absence of hunger. Among the measured maternal feeding practices, 'food as reward' was the only one associated with both EAH and CC scores: mothers who used 'food as reward' more often had children who ate more in the absence of hunger, and surprisingly who compensated better for the ingestion of a preload. Mothers who used 'food as reward' more often were more likely to have a lower level of education, lower income, higher BMI, and to be of non-French origin.



Figure 6: Energy Intake at each meal session. The 1st lunch was a control session (CTR). Thirty minutes before the lunch of the 2nd session, children were offered a preload (pink bar, CC). Ten minutes after the lunch of the 3rd session children were offered palatable foods (yellow bar, EAH).

In conclusion, both studies showed that EAH and CC scores are not correlated, reflecting that eating in the absence of hunger or poorly compensating a preload are two different eating behaviours. Both studies also revealed that the more parents use food as a reward, the more children eat in the absence of hunger.

Reveletter

Discussion session

Three sets of implications were discussed. The first one concerned 'strategies to increase vegetable intake', the second one concerned 'what can we learn from cohort findings' and the third one concerned 'adjustment of energy intake in children: relation with their weight status and with parental feeding practices'. For each, the discussions were initiated via the following questions:

- What do you think about such a recommendation?
- Are there any potential adverse/undesirable effects?
- Are there any potential ethical problem?
- Are current practices very different from the recommendation?
- If so, what could be the main difficulties for the mothers/parents/caregivers in following this recommendation? How can we help parents overcome this difficulty?

Discussion on the findings and implications regarding strategies to increase vegetable intake

Moderators: Gertrude Zeinstra (DLO-FBR) & Anne-Marie Olsen (UCPH) Rapporteurs: Alison Fildes (UCL), Andreia Oliveira (UPORTO), Per Møller (UCPH), Victoire de Wild (WUR)

 Finding: Repeated exposure to vegetables was effective in 3- to 5-year olds when using an unfamiliar vegetable.
 Implication: Repeated exposure to unfamiliar vegetables should be stimulated by parents and caregivers.

- The first comment was that this recommendation is good in principle.
- Most parents give up after 3-5 times so it is different from current practices but there are not necessarily any recommendations. So, guidelines concerning 'repeated exposure' are useful.
- However, participants found this recommendation too simple and asked "What does 'repeated' mean?". They pointed out that there is no temporal dimension and that parents will not know the frequency behind 'repeated'. It was also said that it is not clear what does exposure mean; does it mean visual presentation or actually tasting? Thus, more detailed explanation is needed.
- The question of how many exposures are necessary was raised. It should be stated that this could vary from one child to another, according to a child's age, and for a given child at a given age it could depend on the vegetables.
- The question of portion size was also raised. It should also be specified that small quantities should be offered and that the initial intake could actually be very small (10-20g for the 2-3 first exposures).
- It was also pointed out that exposure should take place at meal times.
- Parents should model eating the vegetable during a meal.
- Children's refusal could lead to stressful eating situations with parents thus
 pressuring children to eat.
- Trying to make a child eat food could result in negative feeding strategies by parents trying to achieve exposure e.g. using food as a reward: 'If you eat your broccoli, you can have some ice-cream'.
- Thus, it is important to tell parents not to force their child to eat, not to use food as a reward. Messages about patience and persistence are necessary.
- However, a key challenge is trying to get children to taste a vegetable after having refused it. In such cases, parents should be told that they can present the vegetable in different forms, by adding in ingredients (cream, sauce or spice) that their child likes, so at least to get their child trying the vegetable and possibly little by little increase their intake of it.

NEWSLETTER N°07 Autumn 2013

 Discussion on the findings and implication concerning strategies to increase vegetable intake

- Reveletter
- If using soups to increase vegetable intake, caregivers should be advised to be vigilant as regards salt intake. In Portugal studies carried out in schools found high salt content in soup. A pinch of salt can be added for young children (not for infants to improve flavour (particularly for masking bitterness) but adding too much salt is not recommended for health reasons.
- It was underlined that boredom can occur if the same vegetable is offered too frequently. Up to now, there are no experimental results on the optimal frequency. However a disliked vegetable should not be offered several meals in a row!
- There was some debate regarding "if something is familiar but disliked?" and 'What do we mean by familiarity?'. In fact 'familiarity' does not mean that children have eaten it on many occasions but that children can identify the vegetable and 'know' they like it or not. Results from HabEat indicate that for familiar vegetables, repeated exposure as well other strategies are not very successful, in particular with children over 3 as at this age they refuse more frequently to taste 'novel' foods (neophobia) and may even reject foods previously accepted (pickiness). So, it should be recommended to introduce a variety of vegetables before the emergence of neophobia and pickiness, i.e. before age of 3.
- Delegates also asked "How varied should a child's diet be?" If they happily eat 5 or 6 varieties of vegetables then do we need to intervene and encourage them to consume a greater variety or can we just advise parents to continue offering this limited variety of liked vegetables frequently enough and in adequate portions? There is no clear answer to this question. It is always worth trying to increase the variety of children's vegetable intake without forcing, but at the same time children do not need to eat all vegetables.
- In conclusion, be more specific with a clear message and practical advice for application.
- 2. Finding: Although not all interventions led to increased vegetable intake over repeated exposure, snacks provided in the form of vegetables did provide a valuable addition to children's usual daily intake. Implication: Parents, schools and day-care centres should be encouraged to offer children vegetables at other moments of the day (in the form of snacks for example) than at meal times especially in countries were vegetables are mainly consumed as part of evening meals at home.

- Participants agreed with this recommendation but pointed out that its implementation could be problematic.
- Delegates indicated that in Poland vegetables are not offered as a snack so it could be culturally sensitive to implement this recommendation. In fact, it is not common to offer vegetables as snacks especially in pre-schools in many countries.
- Thus, it is necessary to educate staff in day-care centres as to the benefits of introducing vegetable snacks.
- As it could be difficult to introduce vegetables as a snack when children are not used to such type of snacking it was suggested using vegetables as snacks at home to start with as then children might become more open to vegetable snacking in a school/pre-school setting.
- Even if it is culturally sensitive, cultures could change and there could be benefits of cross-cultural transmission of ideas and practices.
- One delegate mentioned an on-going EU funded project called "ToyBox" (www.toybox-study.eu). This project is currently conducted in six EU countries with Poland been one of them. Within "ToyBox", a preschool-based, family-involved intervention has been designed and implemented to positively influence energy balance related behaviours in 4-6 year olds, including promotion of vegetables as part of healthy snacks, after adjusting for cultural, legislative and infrastructural differences in the participating countries. This recommendation must be addressed at a policy level, and consequently government's involvement is needed.

NEWSLETTER N°07 Autumn 2013

 Discussion on the findings and implication concerning strategies to increase vegetable intake If parents are concerned about the low energy density of vegetables as a snack then this should be emphasized as an advantage; In fact it is important to point out to parents that in developed countries we have an excess of food options which are more than often too energy dense and thus may lead to overconsumption and weight gain. Thus having vegetables for snacks could help reduce total calorie intake compared to snacking on foods with higher energy intake, and may thus be an advantage.

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- It is important that vegetables replace 'unhealthy' foods. If food and energy intake is already high, then there is no use encouraging vegetables as snacks as an addition to current intake. However, these vegetable snacks could replace more energy dense foods.
- The main difficulties for parents were discussed: Availability of vegetables, awareness of the problem, cultural concerns, food refusal by the child, time to prepare, cost of the vegetables, more effort to make.
- This recommendation is worth pursuing, as it is important to include advice on the best way to implement the recommendations in different situations and cultures.
- 3. Finding: In many HabEat studies, some of the children consumed less than 10% of the offered vegetable(s). Although these children might be the population that would benefit most from increased vegetable intake, they seem unresponsive to the interventions. Implication: Different intervention strategies should be developed for the

non-eater group.

Key points of discussion:

- The first step is to understand why a child is a non-eater. This could be more than just a food issue and there is a need to look at the wider context.
- There are two different questions: (1) why do these children behave in this way?, and (2) How could we change this?
- It is simply possible that some children need more exposures than others. Children classified as non-eaters may just need more time to learn.
- Some children may have a more comprehensive clinical issue that needs to be addressed over and above their eating.
- It could also be a problem of a strong neophobia trait that must be addressed and treated.
- Delegates highlighted that a separate programme for non-eaters within a school setting may lead to a negative experience and prevent peer-modelling.
- Various strategies were discussed for particularly fussy eaters:
 - Try different means of preparing the vegetables, e.g. cooked vs. raw, different cooking types.
 - o Try a lot of different strategies.

 $\circ\,$ The strategy of 'Vegetables by stealth' (i.e. hiding vegetables) was suggested as an option. But this raised another potential risk: if you hide the vegetables, then you are preventing exposure benefits. There was a worry that this could even exacerbate the problem. It was concluded that it could be used as a first step.

 $\circ\,$ Parents should be advised to use tangible non-food rewards, such as sticker rewards.

- o Parents should be advised not to use food rewards.
- Eating a vegetable should be turned into a game.
- o Involve children in preparing and cooking vegetables.
- The need for further research to identify and better understand non-eaters was underlined.



Discussion on the findings and implications concerning 'What can be learnt from cohort findings in HabEat?'





pages

Moderators: Carla Lopes (UPORTO) & Pauline Emmett (UNIBRIS) Rapporteurs: Louise Jones (UNIBRIS), Vassiliki Costarelli (HUA) and Gerry Jager (WUR)

1. Finding: Children born small for their gestational age often encounter eating difficulties and poor eating patterns in the early months (4-6 months), but this effect was less obvious as they grew older. Implications: Parents should be aware that such difficulties will pass with time.

Key points of discussion:

- Parents of infants small for their gestational age may consider that their infant has feeding problems due to the fact that they are small and thus more 'fragile'.
- Parents should be reassured that feeding problems are common and will probably not last but that they should seek help if they are worried.
- More research on small-for-gestational age infants and eating difficulties is needed. In
 particular we need to explore whether feeding problems are the reason why some
 children, who are small for their gestational age, are not able to reach the average weight.
- 2. Finding: Eating difficulties perceived by parents when their child is 4-6 months, were related to low fruit and vegetable intake at 4-5 years of age. Implications: Parents of children with eating difficulties in early life should ensure that they offer them continually a large variety of food early in life to ensure they have a wide food repertoire later in life.

Key points of discussion:

- Delegates suggested reformulating the implications as follows:
 o Remove "large", and introduce instead "a variety of foods, textures, and different
 - ways of preparing food".
 - We should also define "early life".
- Delegates mentioned that, in Poland, parents are advised to give one vegetable at a time and to wait a few days until presenting the next vegetable.
- Message to parents is not to give up offering fruit and vegetables.
- Participants underlined that the recommendations 'repeat exposure' and 'introduce variety' could appear contradictory. In fact, they are not. It must be clear that repeated exposure is a strategy to be used when a food is rejected or disliked. However, repeated exposure does not mean offering the refused/disliked vegetable at every meal and does not prevent offering other vegetables between repeated exposures.
- In conclusion, it was suggested that information should be given about "how to". The examples given in the leaflet used in the 'TASTE' intervention conducted within HabEat (see figure 7) could be provided to parents.
- 3. Finding: The longer an infant is breastfed, namely after the introduction of complementary foods, the more fruit and vegetables they will consume later on. Implication: Breastfeeding should be supported even after weaning. Breastfeeding has many advantages notably offering a wide variety of flavours which may encourage acceptance of a wide variety of food by the child later on.

- Participants indicate that results support an effect of the duration of breastfeeding but do
 not support specifically an effect of breastfeeding after the introduction of complementary
 foods. Thus, it was concluded that the focus should be on the overall duration of the
 breastfeeding period. To increase healthy food variety and fruit & vegetable intake
 continue breastfeeding beyond 3 months and even better continue breastfeeding for the
 whole of the first year while introducing fruits and vegetables no later than 6 months of
 age.
- What the mother eats plays an important role in determining what her child eats, whether breastfed or not, so it is important for her and the whole family to follow a healthy diet.



Discussion on the findings and implications concerning the adjustment of energy intake in children: relation to their weight status and to parental feeding practices

Moderators: Sophie Nicklaus (INRA) & Lucy Cooke (UCL) Rapporteurs: Blandine de Lauzon-Guillain (INSERM), Sylvie Issanchou (INRA), Marion Hetherington (ULeeds) and Sandrine Monnery-Patris (INRA)

 Finding: When fed a snack before a meal, children do not reduce their intake during the meal that follows. Implication: Parents should be advised not to offer a snack before a meal.

Key points of discussion:

- Participants agreed that parents should be given this advice.
- Participants explained the situation in Poland which is quite different from other European countries

• There are 5 eating occasions per day for children (4-5 for adults): breakfast (at around 7 am), a "2nd breakfast" (around 10 am) which is usually composed of a sandwich and fruit, lunch (around 12:00-13:00) with soup, meat, potatoes; a snack at 3 pm after school and then dinner. There is also often a snack between the 2nd breakfast and lunch. The foods offered for this snack are often not very healthy. School canteens and school meals are not very popular. Children from 6 years old can buy food from school shops. They buy foods they like, that are often forbidden or restricted at home.

• What is offered in these school shops is not regulated by law, but by the Head teacher. Dieticians are pressuring the Minister to regulate what is sold in these school shops.

- Participants underlined that there is a need to educate both parents and grandparents who are involved in feeding grand-children.
- 2. Finding: When palatable foods are available after a meal, children generally eat them in large quantities even if they are no longer hungry. Implication: Parents should not make palatable foods easily available to avoid children eating when they are not hungry

- Participants mentioned that of course, palatable foods are available at home. However, it is important that they are not made available at any time of the day. Otherwise, refusing children access to these palatable foods or restricting them too much will have an adverse effect as the "forbidden" food becomes more attractive.
- It was suggested that palatable foods could be included as part of the meal instead of being made available after. This appears to be a good way of allowing children to access palatable foods but not at any time of the day.
- It was suggested that this recommendation is not applicable to all children, but is important in the case of children who risk being overweight.
- Participants pointed out that food also has social implications such as in the case where somebody offers you food that you cannot refuse.
- Participants also highlighted the importance of food quality. If the palatable foods made easily available are fruit, this could be an acceptable and nice way of increasing children's' fruit intake.
- Participants also discussed the issue of 'mindless eating'. It is important to pay attention to situations where 'mindless eating' can occur, for example when children eat watching TV. Moreover, in such a situation, children eat a lot of "empty calories" such as chips.



Discussion group in Poland





Discussion on the findings and implications concerning the adjustment of energy intake in children: relation to their weight status and to parental feeding practices

- 3. Finding: The more parents use food as reward, the more their children eat in the absence of hunger.
 - Implication: Parents should limit the use of food as reward.

Key points of discussion:

- Moderators asked firstly if this is common practice. The answer was 'Yes, we observe this type of practice.'
- It was also indicated that non-food rewards are also used.
- Some families organize a sweet day at the week-end. But some families replace sweets with dried fruits. Even if dried fruits are not empty calories, it was underlined that some dried fruits are high in sugar.
- Lower income families buy food with high calorie content.
- In conclusion, participants agreed that it is clearly important to pursue this recommendation but the questions "How to implement this recommendation?" and "How to help parents to recognize that it is important?" remain.
- 4. Finding: The more parents pay attention to their children's hunger and satiety cues, the less their children eat in the absence of hunger Implication: Parents should pay attention to children's hunger and satiety cues

Key points of discussion:

- Participants pointed out that:
 - Parents often push children to finish their portion having offered too large a portion considering the age of the child.
 - Parents don't trust children's signals.
- Participants mentioned that some children are good at saying they are full. So, the question was "Can children learn to feel they are full and to tell their parents?"
- It was suggested that parents be told "Imagine how unpleasant you would find it being served a portion that is too big and being told to finish it all". Parents must be reminded that they have to adapt the portion size to the age and size of their child.
- Participants underlined that there is no advice given on portion size. However, it was agreed that it is not so easy to give recommendations.
 - Participants also discussed the case of fussy children.
 - If the child is fussy, it is difficult to know if it the child is refusing the food or if the child has reached satiety.
 - Parents try to use distraction with fussy children and thus could miss satiety cues.
- Some children can tolerate hunger. The point was made that it is alright for children to be a little hungry. Sometimes they can be distracted until mealtimes by some other activities. It is not always necessary to give a snack.
- In conclusion, it was said that the recommendation must be more specific and thus should be "Parents should pay attention to children's hunger and satiety cues during the course of the meal". This recommendation does not mean 'no food' between meals if the child is really hungry.
- 5. Finding: The more parents feed their children in a routine, the more children compensate calories Implication: Parents should follow regular feeding routines

- Participants indicated that this recommendation should be more precise as regards the age range as it does not apply to breastfed babies.
- Participants underline that there is no scientific evidence regarding the optimal number of meals per day and that it is necessary to take into account cultural habits.
- Participants also mentioned that parents' work constraints play a role.
- Every child is different. The ability to compensate for calories consumed varies from child to child. Some children will need more help than others in self-regulating their eating.
- At the end of the discussion, the question of the sources of information was debated. There is an increasing use of internet as a source of information but unfortunately the information given is not always based on scientific evidence.





HabEat latest publication

Eating a Rainbow: Introducing vegetables in the first years of life in 3 European countries

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Keywords:

Vegetable intake; European children; Pre-school children; Infants; Vegetables; Liking

Abstract:

Low vegetable consumption in children is a concern in many EU countries as less than one fifth of children in Europe consume the WHO recommended amounts. Systematic studies demonstrate that experience with a variety of vegetables early in childhood can promote later consumption as early dietary habits often track into adulthood.

This study examined pre-school (6 to 36 months) children's experience with vegetables across three European countries in order to assess cultural differences, effects of age and culinary practices. Mothers of pre-school children (N=234) in the UK (N=71), Denmark (N=93) and France (N=70) completed a survey assessing parental and infant familiarity, frequency of offering and liking for 56 vegetables as well as preparation techniques for these vegetables.

Analyses revealed that although children aged 25 to 36 months had been introduced to the greatest number of vegetables, children aged 6 to 12 months who were offered vegetables more frequently had a higher reported liking for these vegetables. UK children's liking was related to frequency of maternal intake and frequency of offering. Denmark had introduced the greatest number of vegetables and offered vegetables more frequently than both the UK and France. However, levels of liking did not differ between countries. Choice of preparation methods differed between countries while choice of seasonings was similar. Results suggest increasing variety and frequency of vegetable offering between 6 and 12 months, when children are most receptive, may promote vegetable consumption in children.

Find the HabEat publications on our website: http://www.habeat.eu/publications.php





HabEat at an EC-US symposium "Understanding Nutrition-Related Consumer Behavior: Strategies to Promote a Lifetime of Healthy Food Choices"

HabEat at external events

The symposium took place on 21st and 22nd May 2013 in Ghent, Belgium.

One session of this symposium was devoted to "Impact of the early environment on the development of eating behaviours across the lifespan: What are the promoters of healthy dietary behaviours?" and was moderated by Dr. Susan Johnson, from the University of Colorado Denver Ansschutz Medical Campus and Prof. Marion Hetherington from University of Leeds.

This workshop considered the state-of-the-science and research gaps on healthy food choices and nutrition-related purchasing behaviours. It was jointly organised on behalf of the EU-US Task Force on Biotechnology. HabEat was represented at this symposium from both the organisers (Prof Marion Hetherington, Leeds) and speakers (Dr Sylvie Issanchou, Dijon) and data from the project were presented to illustrate the most recent findings from our research.

In addition to the talk Sylvie gave on the early environment and its effects on lifelong food choices, there were presentations on individual determinants of food selection and purchasing behaviour; on nudges to promote health as the easy choice; as well as sociocultural, environmental, and policy influences on food selection and consumption patterns. Jennifer Savage Williams (The Pennsylvania State University) reviewed experimental studies on flavour learning and considered motivations of parental behaviours. Jean-Michel Borys, the promoter and manager of "Fleurbaix Laventie Ville Santé Study", described the key points and in particular the importance of a holistic approach for a successful community based intervention. Kathleen Reidy (Nestle Infant Nutrition) focused on parental behaviours such as misreading of satiety signals of their infant, or giving up after only 3 to 5 trials when their child does not accept a novel food.

This unique symposium was attended by representatives from government, industry, and academia all with a joint interest in looking at the science of consumer food choice so that we can understand how to translate this science to assist the consumer. In particular, this conference developed ideas for ways that we can cooperate between Europe and the USA to benefit consumer diet through a better understanding of what drives healthy food choice especially during the first few years of life.

Overall, this unusual and unique conference has laid the groundwork for better contact between Europe and the USA for future discussions. The group identified key gaps for further research involving short term and longer term investments in collaboration to produce healthier, sustainable dietary behaviours with a view to producing healthier outcomes for all.





HabEat at the 10th Pangborn Sensory Science Symposium

The 10th Pangborn Sensory Science Symposium took place between 11st and 15th August 2013 in Rio de Janeiro, Brazil.

WUR presented an oral presentation untitled: "Repeated exposure more effective than flavor-flavor learning as mechanism to increase vegetable consumption in pre-school children"

UCPH presented a poster untitled: "Optimizing mere exposure: How are vegetables most efficiently served to children?"



IUNS 20th International Congress of Nutrition GRANADA (SPAIN), SEPTEMBER 15-20, 2013





http://www.vivacongress2013.co.uk

IUNS 20th International Congress of Nutrition Granada, Spain 15-20th September 2013 (<u>http://icn2013.com/</u>)

"Early diet is critical for later development - new research into changing early eating habits from HABEAT and VIVA"

Members of the HabEat consortium gave presentations to around 200 of the 4000 delegates who attended the recent International Congress of Nutrition. The symposium was chaired by Dr Sylvie Issanchou who gave an overview of both the HabEat and VIVA projects.

Presentations from across the workpackages were given:

- Critical periods for eating habit development; results from cohort studies in France, Portugal, Greece and UK by Dr Pauline Emmett, University of Bristol, UK
- Results of the taste study: an intervention to increase vegetable liking and consumption by exposure to a variety of vegetables at weaning by Dr George Moschonis, University of Harokopio, Greece
- Learning to like vegetables: applying learning theory to the acquisition of preferences for novel vegetables from 6 – 36m by Prof. Marion Hetherington, University of Leeds, UK
- Strategies to increase vegetable consumption in 3- to 6-years-olds: theory and practice by Dr Gertrude Zeinstra, DLO-Food & Biobased Research, The Netherlands
- Caloric compensation and eating in the absence of hunger in early childhood: impact of parental feeding practices by Dr Sophie Nicklaus, INRA, France

The conclusions which were drawn from across the research conducted within HabEat included the following:

- Breastfeeding is associated with eating more fruits and vegetables.
- Introduction of a variety of vegetables at weaning yields benefits for vegetable intake in the short and longer term.
- Repeated exposure is sufficient to promote liking and intake of vegetables in infants and 3–6year-old children.
- It is more challenging to increase vegetable intake in 3–6-year-old children, but choice offers promise for some.
- Young children may fail to regulate intake when challenged and this is associated with the use of food as reward.

The implications of this research for parents and for professionals caring for young children include:

1. Be supportive of **breastfeeding** promotion for taste learning in addition to other benefits.

2. Promote vegetable liking and intake using **repeated exposure** to **novel** vegetables starting at complementary feeding, be persistent

3. Avoid offering snacks before a meal and avoid easy access to palatable foods.

4. Avoid using **food as a reward** since this interferes with the ability to self-regulate and encourages eating in the absence of hunger in children.

The symposium attracted much interest and many questions were put to the speakers. Dr Issanchou fielded questions at the end and delegates had the chance to ask about the application of this research beyond Europe. Further steps for the group included the planning of the final HabEat meeting on March 31st and April 1st 2014 in Dijon, which was announced as an open meeting to all attending the meeting in Granada.







HabEat final symposium: "Improving infant and child eating habits, encouraging fruit and vegetable intake. Translating evidence into practical recommendations



The HabEat final symposium will take place on

31st March (afternoon) & 1st April 2014 (full day)

at the Centre des Sciences du Goût et de l'Alimentation (CSGA) in Dijon, France.

The symposium will report the final results of the HabEat project, which will help to understand better how eating habits and food preferences are formed during the early years of life. Practical implications of these results will be presented. How these implications could be translated into recommendations concerning feeding practices will be discussed with the participants.

Thus, early childhood professionals, paediatricians, political decision-makers in charge of defining nutritional policies, baby food industries, researchers as well as representatives of parents associations will be welcomed.

The aim of this symposium is also to exchange ideas and to cross views with results from other research works. Thus, the programme is open to presentations in the form of posters presentations.

Note this date on your agenda!





Enjoy your journey to visit the beautiful city of Dijon and the incomparable Burgundy

HabEat web site: Information for Parents

Some recommendations on how you can encourage your children to form healthy eating habits are available in the "Parents' section of the HabEat website. These recommendations are based on HabEat results and also on results of previous studies. The information is available in Danish, Dutch, English, French, Greek and Portuguese.

http://www.habeat.eu/



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