



VIVA International Congress

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V is for Vegetable: applying learning theory to liking and intake of vegetables – The early years of life provide a window of opportunity for the development of future healthy eating habits

Speaker Abstracts

V is for vegetable: applying learning theory to liking and intake of vegetables - an overview and introduction. M. Hetherington¹, J.E. Cecil², D.M. Jackson³, C. Vereijken⁴, H. Weenen⁴ C. Schwartz^{1,5}.
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The VIVA project has arisen from a partnership between academics and industry, both interested in discovering how to promote healthy eating in the early years. This Marie Curie IAPP has involved knowledge transfer and exchange between partners through two-way and one-way secondments of research staff between commercial and non-commercial partners. Also through recruited staff, training and networking, the project has delivered research, workshops and a congress involving external researchers, partners, healthcare professionals and stakeholders. The main findings from the audit of recommendations, qualitative research on mothers' views of early feeding, quantitative research on the impact of short interventions with weanlings and pre-school children will lead to academic dissemination and best practice guidelines. This international congress has been planned to promote dissemination of this research and to provide a platform to others from across Europe and beyond to explore state of the art evidence on infant feeding and the best ways to lay the foundations of healthy eating patterns early in life.

The importance of early food learning for the development of healthy food preferences and preventing obesity. L. Birch, Director, Center for Childhood Obesity Research College of Health and Human Development, The Pennsylvania State University.

Beginning prenatally and continuing in the first years of life, experience with food and eating has powerful effects on the development food and flavor preferences. At birth, infants are predisposed to like sweet, reject sour and bitter tastes, and prefer salty tastes by about 4 months. As weaning begins and new foods and flavors are introduced, foods that taste sweet or salty are more likely to be readily consumed than those that aren't sweet or salty, or than sour or bitter tasting foods. Many vegetables contain bitter components, making it likely that they will be initially rejected. Infants are also neophobic, tending to initially reject most new foods, flavors, and textures. This implies that promoting vegetable intake will be more challenging than promoting intake of sweet or salty snacks. However, evidence on what we've learned about children acquire food preferences and eating behaviors can inform the development of interventions designed to promote vegetable intake, increase diet quality and reduce obesity risk.

Eating a variety of vegetables: the importance of feeding practices at weaning and onwards. S. Nicklaus, Centre des Sciences du Goût et de l'Alimentation, UMR 1324 INRA, CNRS, Université de Bourgogne.

Eating a varied diet is known to improve the food intake from a nutritional point of view. Weaning (i.e. introduction of complementary foods) is a transitional process between the consumption of a unique food, milk, and family foods. This is the time when the diet gets progressively diversified. Accumulating evidences point towards the role that eating a varied diet as early as the beginning of weaning plays in the development of further food acceptance and healthy eating habits. These studies will be reviewed, as well as other studies underlying more broadly the role played by parental feeding practices in shaping early food acceptance.

Using rewards to facilitate children's food acceptance. L. Cooke, PhD, CPsychol, Health Behaviour Research Centre, University College London.

A considerable body of research has established that repeated tasting of an unfamiliar food (mere exposure) increases both liking and intake. However, a significant minority of children refuse even to taste new foods thereby preventing learning taking place. This can be a source of significant worry for parents and is a common reason for consulting health professionals. Parents frequently offer rewards to influence their child's food intake and many find this effective, but others express disquiet about using 'bribery'. Overall findings in this area have been mixed, but no studies have demonstrated the positive effects of rewards on liking that might be expected. A more consistent picture emerges from the literature examining effects of rewards on intake. Broadly speaking, rewards produce immediate increases in healthy food intake in both clinical and non-clinical settings. Recent research in school and home settings has established that using small non-food rewards can increase intake and liking for vegetables in the short and longer-term. A further study showed that this feeding procedure can be implemented by parents without researcher input, suggesting its promise as an easily disseminable public health resource.

Mum, may I have Brussels sprouts again? C. de Graaf, Division of Human Nutrition, Wageningen University, The Netherlands.

The group of vegetables is the sole food group that has little reinforcement value in term of sensory, nutrient, or satiety value. Repeated exposure has been shown to be one of the most effective ways to increase liking. This study had the objective to investigate whether weaning exclusively vegetables for 18 days would lead to a higher vegetable intake after weaning, at 0.5 and 1.5 years follow up. Weaning with vegetables (n = 51) was compared to weaning with fruits (n = 50). The results showed that vegetable intake just after weaning was higher in the vegetable group (mean intake 45 ± 40 g) than in the fruit group (24 ± 29 g). Reported vegetable intake at home at 12 months of age was also higher in the vegetable group (75 ± 43 g) than in the fruit group (54 ± 29 g), but no difference was found at 23 months of age (48 ± 43 vs. 57 ± 35 g). It is concluded that weaning exclusively with vegetables results in an higher vegetable intake just after weaning. The effect persisted after 6 month follow up, but it was gone 18 months after follow up.

Facial expression as a window on food and flavour preferences and aversions in infants and children. H. Oster, New York University, McGhee Division, School of Continuing and Professional Studies.

The Facial Action Coding System for Infants and Young Children (Baby FACS) has proven to be a reliable and sensitive tool for investigating the sensory capacities and hedonic responses of newborn infants. Using Baby FACS, Rosenstein and Oster (1988) demonstrated that 2-hour-old infants

without postnatal taste experience showed differential facial expressions to sour, bitter, and salty solutions as well as sweet vs. non-sweet solutions, demonstrating their discrimination of these tastes. Their facial responses to sucrose involved hedonically positive facial configurations, while their responses to the salty, sour, and bitter solutions involved hedonically negative facial configurations. The distinctive lip pursing in response to sour tastes and mouth gaping in response to bitter tastes may have served biological as well as communicative functions. These results clearly show that a preference for sweet tastes is present from birth, suggesting it was adaptive in our evolutionary past. On the other hand, several investigators have recently demonstrated that early experience plays a role in the development of taste preferences and aversions. In discussing these studies I will pose the question of whether infants and children are doomed to crave sweets or whether we can modify children's food preferences and aversions by manipulating early experience.

Early origins of childhood obesity. J. J. Reilly, School of Psychological Sciences & Health, University of Strathclyde.

Obesity appears to have a very simple origin, arising from an excessive positive energy balance. The causes of positive energy balance are in fact complex. The presentation will describe the main early causes of/ risk factors for childhood obesity, identified by recent systematic reviews, and even 'reviews of systematic reviews': sedentary behaviour; low physical activity; formula feeding; sugar-sweetened drinks; lack of sleep. The origins of obesity seem so simple and obvious that it is easy to take a non-evidence based approach to prevention in research, in health care, and in health policy, and so a logic model for prioritising early obesity prevention interventions will be presented. Some potential causes of childhood obesity may merit greater attention. 'Early Adiposity Rebound' will be considered as an important risk factor for obesity which is modifiable but which has been neglected to date. Recent evidence on the timing of obesity development may also provide important clues as to the origins and prevention of childhood obesity in future. The presentation will touch briefly on ongoing and recently published trials of preventive interventions in infancy and early childhood. Finally, the presentation will consider the extent to which childhood obesity research might be disconnected from families, health professionals, and policymakers. 'Mainstream' evidence among childhood obesity researchers is not widely known, and possibly not even believed, by many stakeholders.

Infant feeding and later risk of obesity. M. Fewtrell, Reader in Childhood Nutrition, Honorary Consultant Paediatrician, University College London Institute of Child Health, London.

Rapid infant growth is associated with increased risk of later overweight and obesity, and infant nutrition is the major modifiable factor driving growth. Two RCTs examined effects of breastfeeding on later obesity, and both found no significant effect. 5 systematic reviews and meta-analyses concluded that a history of breastfeeding is associated with reduced obesity risk, but cautioned against assuming a causal relationship. A systematic review examining the relationship between age at introduction of solids and obesity found no consistent association. The only randomized trial reported no significant effect of introduction of solids at 3 versus 6 months on outcomes up to 12 months. A recent observational study suggested that introduction of solids before 4 months was associated with higher BMI at 3 years in formula-fed but not breast-fed infants. There is currently a lack of evidence for causal relationships between milk feeding or age at introduction of solids and later obesity; failure to detect consistent associations using these fairly blunt indicators is not surprising if infant nutrient intake and growth are important mediators. Future research should focus on nutritional intake and content of the whole diet rather than on the type or timing of weaning per se.

Contributing to healthy eating habits in the youngest – HENRY’s experience. M. Rudolf, Bar Ilan Faculty of Medicine in the Galil, Israel; Leeds University, UK.

HENRY¹ – Health Exercise Nutrition for the Really Young – aims to prevent obesity by helping parents provide babies and young children with a healthy start to life. It offers a variety of courses and resources for professionals, parents and carers. Recent evaluation of one component, the Let’s Get Healthy with HENRY parent programme, shows a reassuring increase in children’s consumption of vegetables. In the session we will reflect on the evidence base on which HENRY was founded, and the components that are likely to have contributed to the encouraging change in vegetable consumption and family lifestyle. These include a reported increase in parents’ confidence and parenting skills, their own adoption of healthier eating behaviours and food, and changes in family eating habits. It was expected that there would be an increase in professionals’ self efficacy following HENRY training, however we did not anticipate that professionals would report making substantial changes within their own families too. This positive finding no doubt helps to make HENRY trained practitioners more credible and successful in their work with parents. The VIVA Congress promises to bring fresh evidence about ways that very young children can be encouraged to eat more vegetables. HENRY offers a vehicle for translating this research into practice through its work with parents and the professionals who support them. ¹www.henry.org.uk

Are maternal practices associated with children’s eating difficulties? S. Issanchou, CNRS, UMR6265 Centre des Sciences du Goût et de l’Alimentation, F-21000 Dijon, France. INRA, UMR1324 Centre des Sciences du Goût et de l’Alimentation, F-21000 Dijon, France. Université de Bourgogne, UMR Centre des Sciences du Goût et de l’Alimentation, F-21000 Dijon, France.

Children’s fussiness has a negative impact on the quality of young children’s diet. Here I will report a work conducted in our laboratory on the links between maternal feeding practices and children’s eating difficulties. Mothers (n=502) of children aged 20 to 36 months were asked to complete four questionnaires that were validated using Confirmatory Factor Analysis. The links between child’s fussiness and maternal feeding components were assessed using a Partial Least Square regression. The results indicate that the Children’s Eating Difficulties Questionnaire yielded a 4-dimension solution: Neophobia, Pickiness, Low Appetite and Low Enjoyment in food. The Feeding Style Questionnaire assessed three dimensions: Authoritarian, Authoritative and Permissive Styles. The Feeding Strategy Questionnaire, designed to evaluate strategies used by mothers to make their child taste rejected foods, resulted in four factors: Coercion, Explanation, Contingency and Preference. The Questionnaire relating to Parental Motivations when buying food for children presented a 6-dimension solution: Convenience, Weight-control, Natural, Health-concern, Preference and Price. Moreover, we found that the factors associated positively with the four dimensions of the Children’s Eating Difficulties Questionnaire were on the one hand Permissive Style and Practices to fulfil children’s desires, and on the other hand Authoritarian Style, Contingent and Coercive Practices aimed at forcing children to taste rejected foods.

The present results were reported in Rigal, N., Chabanet, C., Issanchou, S., & Monnery-Patris, S. (2012). Links between maternal feeding practices and children’s eating difficulties. Validation of French tools. *Appetite*, 58, 629–637.

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Child and maternal determinants of infant eating behaviour. C. Wright, Professor of Community Child Health / Consultant Paediatrician School of Medicine, Glasgow University.

It is suggested that a child's later eating patterns may be set in infancy, but evidence for this is scarce. In the Gateshead Millennium cohort study we have demonstrated a complex relationship between maternal and child characteristics which determines both duration of breast feeding and age at weaning and that eating avidity in infancy is more strongly related to subsequent growth than later adiposity. We have found only limited evidence of an effect of social and maternal characteristics on infant weight gain. At the age of 30 months affluent infants had tried slightly fewer foods and liked a similar number of vegetables compared to the most deprived infants. The percentage of toddlers reported to have never tried 8 common vegetables range from 1% for carrots, baked beans and peas to 16% for lettuce (tomatoes (7%) cabbage (11%) onion (14%) cucumber (15%)). The number of vegetables liked was significantly predicted by parentally rated appetite at 12 months, but the strongest predictor was the number tried and this was weakly inversely related to adiposity at age 7-8 years. Eating behaviours in infancy and maternal responses are strongly driven by the need for rapid growth and relate only poorly to the later onset of overweight.

Implementation of new insights into feeding. J. C. Seidell, VU University Amsterdam, The Netherlands.

Barriers towards implementation of feeding styles usually stem from upstream determinants of health-related behaviour such as socio-cultural, economic and physical aspects of environment. Conditions such cultural norms, area deprivation, psychosocial hazards, local food environments and commercial messaging are major drivers of feeding practices. Implementation of new knowledge and new skills related to feeding should always be contextual and culturally appropriate. On an individual basis they should also be linked to intrinsic motivation (i.e. autonomy, skills and relatedness as developed in self-determination theory). Examples of successful implementation strategies will be presented.

Parenting, feeding and fruit and vegetable consumption in infancy and early childhood: what works? J. Blissett, School of Psychology, University of Birmingham.

The foods that tend to be rejected by children include those which may have greatest importance for later health. This presentation will review some of the parenting influences on children's eating behaviour, with particular reference to their acceptance of fruits and vegetables into their diet. The literature on the relationships between children's fruit and vegetable consumption and parental modelling, parenting style, the family food environment, infant feeding practices (including breastfeeding and age at weaning), and concurrent feeding practices (including the use of rewards and prompts) will be reviewed. The talk will describe existing interventions to improve fruit and vegetable consumption in this age group which involve parents. The talk will also discuss some other specific parental strategies that may be useful to explore using interventions.