Familiarity and liking of vegetables: Is it important for vegetable consumption?

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Abstract

The results presented in this paper are part of the early findings from a large European study, VeggiEAT involving the UK, Denmark, France and Italy with the aim of improving vegetable consumption in young people and older people. The results presented here are from UK young people (aged 12–14) focusing on familiarity and liking of vegetables and looking at their vegetable consumption and awareness of what constitutes a healthy diet. The study adds to the literature on vegetable familiarity, liking and consumption in this age group.

Early exposure of young children to a variety of vegetables is very important and parents/carers and school nurses need to understand the importance of this in terms of the foods offered and available early within a child`s life and the potential influence of this on vegetable consumption over their lifetime.

Obesity is now one of the most serious global public health challenges of the 21st century, globally in 2013 the number of overweight under-5-year-olds was estimated to be over 42 million (World Health Organization (WHO), 2014). This early period of life is recognised as a critical time in the development of the child as it lays the foundation physically, mentally and socially for later health and health behaviour. Currently more than one in three 11–15-year-olds in England are overweight or obese, and recommended physical activity levels are not being met, further exacerbating the situation (Department of Health, 2015). Overweight and obesity in children and adolescents is likely to persist into adulthood bringing with it all of the associated health concerns such as cardiovascular disease, some cancers, musculoskeletal disorders and diabetes. For these reasons the WHO and its member states have given the prevention of childhood overweight and obesity high priority, with one of the recommendations being to increase consumption of fruit and vegetables (WHO, 2014). Interventions to date to improve vegetable intake have been tried with varying degrees of success (Appleton et al, 2016).

Positive correlations have been made between the level of fruit and vegetable consumption and overall health. They provide the body with essential vitamins and minerals and fibres (Food Standards Agency (FSA), 2014) and are acknowledged to significantly reduce the risk of many diseases, including cardiovascular disease and some cancers (Joshipura et al, 2001). In addition to these advantages, studies have shown that by including fruit and vegetables within a meal, the overall satisfaction level increases (Vanhala et al, 2010).

The results presented here are from UK young people (aged 12–14) focusing on familiarity and liking of vegetables and looking at their vegetable consumption and awareness of what constitutes a healthy diet. The study adds to the literature on vegetable familiarity, liking and consumption in this age group.

The recommended UK Government intake for everyone over the age of 5 years is at least five portions of fruit and vegetables daily, which is in line with the rest of Europe. However, in the UK in 2009, regardless of this recommendation, only 21% of children and young people were consuming these five portions daily, with the average being 2.5 portions (FSA, 2014). This article will present up to date insights into these consumption rates in the UK. This has significance for growth and development (Falciglia et al, 2000) as well as developing poor eating habits that will persist into adulthood.

What influences vegetable intake?

As children grow and age, taste, appearance and liking appear to continue to be important in relation to vegetable intake (Poelman et al, 2015; Appleton et al, 2016); but, considering the international evidence, lower consumption may also be associated with elements of the family context including:

- Low levels of parental education (Bjelland et al, 2013)
- Low socio-economic status (Bjelland et al, 2013; Burnier et al, 2013; Valmórbida and Vitolo, 2014)

- Low vegetable consumption by parents and caregivers (Sweetman et al, 2011; Wroten et al, 2012; Zeinstra et al, 2009)
- Low availability and negative perceptions of vegetables in the home (Koui and Jago, 2008)
- A family environment that is unsupportive of vegetable consumption (Sweetman et al, 2011; Zeinstra et al, 2009; Melbye et al, 2012).

Vegetable consumption has been shown to be higher, however, in families where vegetables are:

- Disguised or sauces are used to mask apparently undesirable tastes and appearances (Poelman et al, 2015; Sweetman et al, 2011; Zeinstra et al, 2009)
- Where vegetables may be more often included in composite foods to dilute potentially negative taste and appearance (Poelman et al, 2015)
- Where meals are cooked at home to comply with individual preferences (Sweetman et al, 2011)
- Where games are used to further encourage consumption (Zeinstra et al, 2009).

Taste, appearance, texture, liking and the surrounding environment continue to be important as children become adolescents; however, low vegetable consumption in adolescents has again been associated with:

- Low parental education and socio-economic status (Peltzer and Pengpid, 2010)
- Low vegetable consumption by the parents (Draxten et al, 2014)
- Lack of availability
- Family contexts that are not supportive of vegetable consumption (Peltzer and Pengpid, 2010; Middlestadt et al, 2013)
- Vegetable consumption in adolescents however has been associated with an awareness of the importance of vegetables for health, and a willingness and ability to ask for vegetables from parents (Middlestadt et al, 2013).

Adolescents are on average eating more fruit than vegetables however, with this slowly reversing as they grow older (FSA, 2014). Studies have shown that preferences can be determined strongly through levels of sweetness within a food, which may explain why fruit is preferred over vegetables, as many vegetables are more bitter in taste (Brug et al, 2008; Mennella et al, 2005; Wardle et al, 2003). Sensory factors also have an effect on the consumption of vegetables among children, as children judge the food they eat on sensory (Morizet et al, 2011) and aesthetic properties, which means that if they do not feel it looks and tastes familiar and they like it, they will not eat it. For children consumption may increase when the vegetables are disguised or sauces mask the tastes (Poelman et al, 2015; Sweetman et al, 2011). The diversity of foods, and in particular vegetables, eaten by children is limited, as they have a tendency to frequently consume the same foods (Falciglia, 2000).

There is now a greater emphasis on healthy eating within schools, which may have some bearing over the increase of fruit and vegetable consumption within the school

environment in the UK (School Food Standards, 2015). However, the influence that parental eating habits have over children cannot be underestimated, especially as parents make the underlying purchasing decisions in terms of the food that their child will have access to and consume (Ilkay, 2013). Studies have shown that the behaviours and habits of parents heavily influence those of their children (Maschinot, 2008; Lafraire et al, 2016). Parents are likely to offer food that they eat and like and are unlikely to offer foods that they dislike, which minimises the variety of foods available to the family which in turn contributes to the development of food preferences in children and adolescents (Ahern et al, 2013). In addition, parental education also plays a part in the availability of vegetables in the home (Bjelland et al, 2013; Valmórbida and Vitolo, 2014) and whether parents are supportive of vegetable consumption (Melbye et al, 2012).

Considering the international evidence base it appears that interventions aimed at increasing knowledge in young people of the benefits of improved food choice based on the assumption that better information would lead to healthier choices (Hoefkens et al, 2011) have had only modest, if any effect on eating behaviour (Pérez-Cueto et al, 2012). Numerous factors may play a more important role in the choice and intake of food other than simply information, as already outlined in this article. A better acknowledgement of these factors is needed in order to improve the efficacy of public health policies and interventions as the establishment of good food habits in the young needs to be prioritised.

Methods

The results presented in this article are part of a large European study called VeggiEAT involving the UK, Denmark, France and Italy, which has the aim of improving vegetable consumption in the elderly and young people. The results presented here are from a sample of young people in the UK taking part in the first stage of the project, which focused on familiarity, liking and consumption (data were collected in 2015).

Questions were worded age appropriately and a variety of answering scales were used including the dichotomous scale, category scale and likert scale, which improved the reliability of the results and avoided the participant becoming disinterested.

Participants were asked to rate, on a scale of 1 to 5, how familiar they were with each vegetable presented (*Table 1*) chosen because of their likely familiarity to adolescents. The children were asked to rate how familiar they were with each vegetable on a 5-point scale asking them to choose from (*Table 1*):

- I do not recognise this
- I recognise this but I have not tasted it
- I have tasted but I do not eat this
- I occasionally eat this
- I regularly eat this.

Table 1. Familiarity Questionnaire results

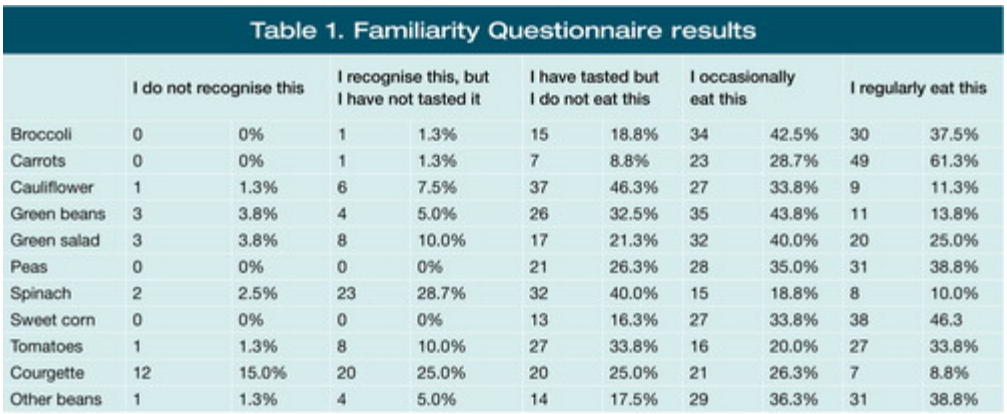

Table 1. Familiarity Questionnaire results										
	I do not recognise this		I recognise this, but I have not tasted it		I have tasted but I do not eat this		I occasionally eat this		I regularly eat this	
Broccoli	0	0%	1	1.3%	15	18.8%	34	42.5%	30	37.5%
Carrots	0	0%	1	1.3%	7	8.8%	23	28.7%	49	61.3%
Cauliflower	1	1.3%	6	7.5%	37	46.3%	27	33.8%	9	11.3%
Green beans	3	3.8%	4	5.0%	26	32.5%	35	43.8%	11	13.8%
Green salad	3	3.8%	8	10.0%	17	21.3%	32	40.0%	20	25.0%
Peas	0	0%	0	0%	21	26.3%	28	35.0%	31	38.8%
Spinach	2	2.5%	23	28.7%	32	40.0%	15	18.8%	8	10.0%
Sweet corn	0	0%	0	0%	13	16.3%	27	33.8%	38	46.3
Tomatoes	1	1.3%	8	10.0%	27	33.8%	16	20.0%	27	33.8%
Courgette	12	15.0%	20	25.0%	20	25.0%	21	26.3%	7	8.8%
Other beans	1	1.3%	4	5.0%	14	17.5%	29	36.3%	31	38.8%

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Other beans	1	1.3%	4	5.0%	14	17.5%	29	36.3%	31	38.8%

They were also asked to rate how much they liked or disliked those same vegetables on a 9-point Likert scale ranging from ‘dislike extremely’ to ‘like extremely’. In addition, they were asked ‘true or false’ questions about how many fruit and vegetables they eat every day and whether or not they try to eat a healthy diet.

Data were analysed through descriptive statistics and a Spearman's Rho Correlation test was used to highlight and evaluate whether familiarity and liking held a relationship.

Ethical approval

This study received UK University ethical approval and gained consent from the young people and their parents in order to undertake the data collection outlined here.

Results

In June 2014 a total of 80 children participated in the research with 42 (52%) females and 38 (48%) males. Ages included were: 24% 12 years, 66% 13 years, and 10% 14 years. In order to compare the participant responses to national averages and the Government's recommendations participants were asked to specify how many portions of fruit and vegetables (excluding potatoes) they eat daily (*Figure 1*). Responses demonstrated that 9% of children were eating the recommended five portions a day, with 40% eating 1–2 portions a day. The overall mean intake of fruit and vegetables among the sample respondents was 2.56 portions, which is slightly above the national average, however, still below the recommendation. 21% of children who filled out the questionnaire did not eat one portion of fruit per day and 23% did not eat one portion of vegetables per day.

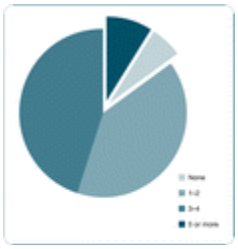

Figure 1. Fruit and vegetable consumption

Familiarity

Broccoli, carrots, peas and sweet corn are the most recognised of the vegetables included, with 100% of children recognising them. With regards to consumption, cauliflower and spinach are the two highest scoring vegetables with over 40% of children having previously tasted them, but not regularly eating them. The vegetables that scored slightly less are green beans, peas, tomatoes and courgette.

The overall mean scores for the familiarity of each vegetable are ranked with the most familiar at the top and the least familiar at the bottom (*Table 2*). The highest mean derived from carrots, which had a mean familiarity of 4.50, it was also the vegetable that was most regularly eaten. Courgette was the lowest scoring vegetable with 2.89 and was also the vegetable children claimed not to recognise at all.

Table 2. Mean familiarity of vegetables

Table 2. Mean familiarity of vegetables	
Vegetable	Mean and standard deviation
Carrots	4.50 ± .712
Sweet corn	4.33 ± .767
Broccoli	4.16 ± .770
Peas	4.13 ± .802
Other beans	4.10 ± .963
Tomato	3.79 ± 1.099
Green salad	3.72 ± 1.067
Green beans	3.59 ± .927
Cauliflower	3.46 ± .841
Spinach	3.05 ± .992
Courgette	2.89 ± 1.212

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Liking

In order to compare the familiarity results to how much the vegetable is liked, the participants were asked to rate how much they liked the same list of vegetables on a scale from 1–9 (1=strongly dislike and 9=strongly like). The mean results are presented in ranked order in *Table 3*, displaying the most liked at the top down to the

least liked at the bottom. The four most liked vegetables, carrots, sweet corn, other beans and broccoli all scored above 5. Spinach and courgette were the least liked vegetables scoring 3.58 and 2.91, with the remaining tomatoes, green salad, green beans and cauliflower being moderately liked with scores between 4 and 5.

Table 3. Mean liking of vegetables

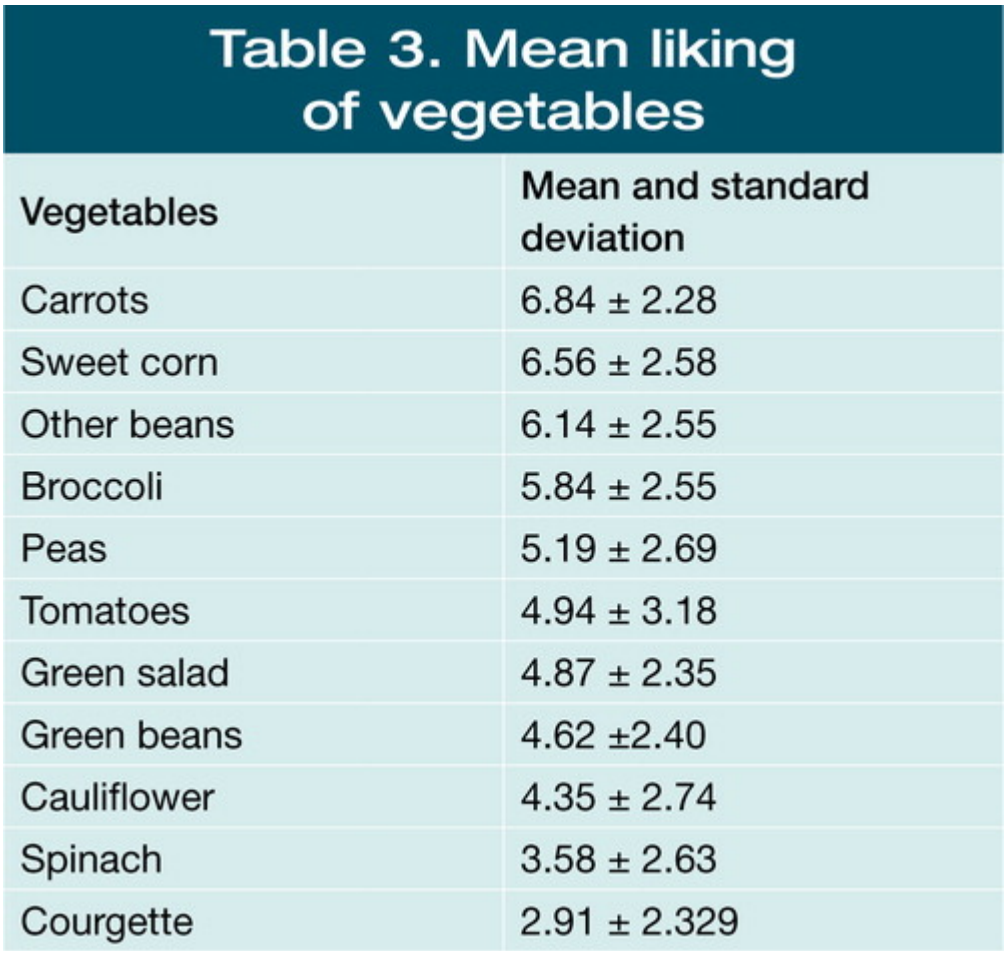

Table 3. Mean liking of vegetables	
Vegetables	Mean and standard deviation
Carrots	6.84 ± 2.28
Sweet corn	6.56 ± 2.58
Other beans	6.14 ± 2.55
Broccoli	5.84 ± 2.55
Peas	5.19 ± 2.69
Tomatoes	4.94 ± 3.18
Green salad	4.87 ± 2.35
Green beans	4.62 ±2.40
Cauliflower	4.35 ± 2.74
Spinach	3.58 ± 2.63
Courgette	2.91 ± 2.329

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Carrots	6.84 ± 2.28
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Other beans	6.14 ± 2.55
Broccoli	5.84 ± 2.55
Peas	5.19 ± 2.69
Tomatoes	4.94 ± 3.18
Green salad	4.87 ± 2.35
Green beans	4.62 ±2.40
Cauliflower	4.35 ± 2.74
Spinach	3.58 ± 2.63
Courgette	2.91 ± 2.329

There was a moderate positive relationship between the familiarity and liking of the vegetables, with a strong positive relationship coming from peas ($r=0.69$, $df=77$, $P<0.001$) and tomatoes ($r=0.72$, $df=77$, $P<0.001$).

Discussion

Participants in this research are eating just over two and a half portions of fruit and vegetables per day, which is in line with the national average in the UK (FSA, 2014), however, not with the recommended five portions of fruit and vegetables per day (FSA, 2008; National Health Service, 2016).

The lack of recognition for some vegetables could be due to the lack of variety served at home, or alternatively, could be linked to the lack of variation within school meals provided to children. In order to increase variety, it is important to experiment with taste and texture at an early age, in order to encourage creativity with food in terms of exploration.

Recently, new school food standards were introduced in order to encourage children to adopt healthy eating behaviours and consume a variety of foods that will sustain their nutrition needs (School Food Standards UK, 2015). The standards acknowledge the importance of the way in which food is presented, as well as the way it tastes.

It is important to address taste characteristics that children may find unacceptable in vegetables and attempt to counteract this. Children are often disinterested in the benefits and implications of the food that they consume and more concerned with tastes. Conversely, children are also influenced by the environment around them, for example the habits of peers and family, and consequently may be encouraged to try and eat vegetables in social settings (Eertmans et al, 2005). Therefore, it is important that parents/carers have the appropriate knowledge regarding the health benefits and implications of particular foods. It is important that children are educated on the benefits of healthy eating and vegetables, as well as the implications that can come when they consume a large amount of fatty and calorific food in order for them to build foundations for their own knowledge and future eating patterns. This may be especially important for adolescents as vegetable consumption is associated with an awareness of their health benefits, making it more likely that they will ask for vegetables to be included in their diet or choose vegetables to eat (Middlestadt et al, 2013).

There are numerous ways in which children can be encouraged to eat more vegetables, for example, studies have shown that children consume 80% more vegetables when a dip is added (Fisher et al, 2012). Therefore, by only altering the flavour or even the way in which the vegetable is served or labelled for instance in a composite dish we can encourage increased consumption (Morizet et al, 2012). In recent times, more innovative ways to encourage and promote vegetable consumption are emerging. ‘Cauliflower Rice’ is an evolving concept which can encourage the consumption of cauliflower, which was established as a vegetable with low consumption rates. By mincing or pulsing the cauliflower, it resembles the consistency and shape of rice (Vance, 2015).

Conclusions

Strategies to increase vegetable intake in children and young people have the potential to positively influence intake across the life course and need to consider liking and familiarity research evidence. Practitioners could consider taking a whole school approach which might include influencing food, drink and snack provision and supply, enabling family involvement, repeated tasting, preparation and education experiences along with developing the child`s awareness of sustainable approaches to growing vegetables (plough to plate) (Glasson et al, 2010).

There is a scarcity of research in this area of children's vegetable consumption from a practical aspect, while there is a growing interest in the future sustainability of current dietary patterns in light of increasing population obesity and related disease. This means that the VeggiEAT research project as it progresses should be of particular interest to those involved in promoting healthy food for children and young people; with school nurses being in a powerful position to develop a `whole school` approach to increasing vegetable consumption.

Conflict of interest: The VeggiEAT project has received funding from the European Union's Seventh Framework Marie Curie Programme for research, technological development and demonstration under grant agreement no 612326.

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