An experimental food label applied to food served at a school (aged 11–18 years) in Greater London and its influence on adolescent food choices

An experimental food label applied to food served at a secondary school in Greater London and its influence on adolescent food choices.

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Abstract

Adolescent obesity is more prevalent in the United Kingdom than in almost any other higher income nation. Providing nutritional information in the form of a food label (FL) is one strategy that has the potential to reduce obesity because it informs choices. School food can theoretically provide a third of an adolescent's daily calorie intake, yet schools in England have no policies to guide pupils to the healthiest food choices on offer.

This is a pragmatic study, designed and applied an experimental FL in the form of a nutritional `food score` to the food on offer in a secondary school in Greater London. Quantitative survey data was collected at three time points for a total of nine weeks to explore if the FL influenced adolescent to select healthier food options in real time data. In addition, data from a food choice questionnaire identified which factors adolescents ranked as having the greatest influence on their food choices in order to evaluate if these factors require greater integration at policy level to reduce adolescent obesity.

The results indicated that with the application of the FL there was no significant effect on a change in food choices. The factors that adolescents ranked the highest that most influenced their food choices were taste, hunger, price, health, appearance, smell, and food that keeps them awake. The factor that adolescents unanimously ranked that did not affect their food choices was the influence of friends.

1. Introduction

Adolescents (age 10-24 years) make up a fifth of the United Kingdom population and obesity is more prevalent in the United Kingdom in older adolescents (age 15-19 years) than in almost any other higher income nation (Shah et al., 2019). One in five adolescents in the UK (age 11-15) are obese, and yet these figures exclude those adolescents in the overweight bracket, which could indicate that there may be an underestimation of the problem in this population (GOV.UK, 2017; Buck, 2020). Obese adolescents tend to remain obese into adulthood and therefore, interventions to reduce obesity during this lifespan are important as they can lay foundations for a healthier life in adulthood which in turn brings better social, health and economic benefits to the UK (Shah et al., 2019).

Food label (FL)
Nutrient profiling (NP)

Providing nutritional information in the form of a food label (FL) is one strategy that has the potential to reduce obesity. A FL allows consumers to compare the nutritional information between similar food products which can theoretically inform consumers as to which are the healthier food choices (Arambepola et al., 2008; Chiuve et al., 2011; Arsenault et al., 2012; Storcksdieck Genannt Bonsmann and Wills, 2012; Food Standards Agency (FSA), 2020). Since December 2016 all prepacked food in the UK was required to display mandatory nutritional information on the back of a FL, presented per 100g/ml or per portion of the product (National Health Service (NHS), 2018; FSA, 2021). Nutritional information on the front of prepacked FL is voluntary and is predominantly assessed through nutrient profiling (NP). NP is the science of ranking foods in accordance with their nutritional composition to prevent disease and promote health (World health Organization (WHO), 2011). NP can provide information that can be used for several purposes. NP can categorise foods such as `low in fat` (less than 3 grams of fat/100g) or `high in salt` (more than 1.5gram/100g) (NHS, 2018). NP can score the healthiness of individual foods and generate definitions such as `unhealthy` or `healthier` which describes the effect of consuming that food on an average person's health (Arambepola et al., 2008; Townsend, 2010; WHO, 2011; Rayner et al., 2013; Arora and Mathur, 2014). NP can also provide information for FLs which can be a nutrient specific or a summary system (Arambepola et al., 2008; WHO, 2011; Chiuve et al., 2011; Arsenault et al., 2012); and can be used to regulate foods that are marketed to children (Rayner et al., 2009; Rayner et al., 2013). Multiple NP models exist which differ according to their purpose of use (Tetens et al., 2007; Arora and Mathur, 2014). However, the NP models that provide information for FLs have resulted in a plethora of front of pack FL designs yet, there is no consensus as to which design has the greatest influence on food choice behaviour.

One third of an adolescent's daily calorie intake can theoretically be consumed at school. Main meals provided at school in England must comply with the Department for Education (DfE) School Food Standards (DfE, 2021). However, the Office for Standards in Education (Ofsted) are responsible for correlating all other guidance to support pupils on informed food choices and healthy eating (School Food Plan, 2015; Food for life.org, 2018). Despite Ofsted inspections and the School Food Standards, there is no guidance or education for pupils as to which food items on offer are the healthiest or less healthy choices.

The UK government has announced that from April 2022 it will enforce all businesses with 250 or more employees in England including cafes, restaurants and take away food to display calorific information on non-prepacked food and soft drinks (GOV.UK, 2021) however, this does not include school food. Yet, systematic reviews on the effectiveness of proving calories on non-prepacked food is inconclusive. Krieger and Saelens (2013) found an overall reduction of between 10 - 20 calories per meal in simulated laboratory settings. Cantu-Jungles et al., (2017) evaluated the effect of providing nutrition

Food label (FL)
Nutrient profiling (NP)

labelling for both calories and nutrients and found that menu labelling in a live setting did not show any notable change on calories, total fat, saturated fat, sodium, or carbohydrate ordered or consumed amongst American adults.

Displaying calories on a FL in a school setting has been a consistent choice in which to measure if there are changes in food choice behaviour. There are three known published studies (Conklin et al., 2005; Rainville et al., 2010; Hunsberger et al., 2015) and one study which was undertaken but not published (Fresques', 2013) that have offered nutritional information in the form of calories and fat in a live school setting in America. Conklin et al., (2005) applied a FL to main course dishes at the point of sale. Results indicated that when supplying nutritional information pupils selected food choices lower in fat and calories, but the differences were slight to moderate. Rainville et al., (2010) measured calories and fat per serving in main course dishes purchased pre - and post the application of the FL. Results indicated an increase of 6.6 calories per menu item in the intervention group and decreased calories selected in the control group. Hunsberger et al., (2015) found a decrease of an average of 47 gross calories purchased/day and a reduction of an average of 2.1 grams of fat/day and the authors suggested that the FL caused pupils to take smaller portions of food. Fresques (2013) results indicated that daily calories per student between pre-intervention baseline and intervention data decreased from 602 to 596 but this was not significant, and fat remained at 23g both pre and post the intervention. Collectively, these studies cannot verify that providing information for either calories or fat influences adolescent food-choice behaviour at school. Moreover, providing calorie information on food in a school setting may not be the most appropriate FL format. Many adolescents employ dietary restraint to strive to conform to `thinness,` which may lead to nutritional vulnerability (Shepherd and Dennison, 1996). Due to this possible vulnerability, a more overarching holistic FL is needed to guide young people to healthier food choices in school.

In 2009, the UK Office of Communications (Ofcom) (a government-approved regulatory and competition authority for broadcasting), requested the assistance from the UK Food Standards Association (FSA) to produce a set of criteria to assess whether food items intended to be advertised to children on television were nutritionally balanced (Rayner et al., 2009). The FSA commissioned the British Heart Foundation (BHF) to design a nutrient profile model. This model produced a numerical score for any given food product per 100g. In this model, a food score of four points or more classified the food as `less healthy`. Only foods that scored below four from the healthy category could be advertised on television during children's viewing times. Rayner et al., (2009) suggested that this profile can also be used as a quality criterion for products supplied to school meals, hospitals, and the armed forces and for health impact assessments of meal service policies. Rayner et al., (2009) stated that `the model can be adjusted so that points for foods and drinks fall on a scale from one to 100

where one is the least healthy and 100 is the most healthy product using a simple formula: NEW SCORE = (-2) *OLD SCORE + 70` (Rayner et al., 2009 pg. 8). This score is based upon per 100g of any given dish. Healthier food choices are calculated from their percentage per 100g from vegetables, fruits, seeds, nuts, legumes and per 100g from protein and fibre. Foods that are less healthy are calculated as foods that contain saturated fat, sodium, total sugars per 100g and kilo joules (kJ) energy content per 100g. Overall, foods that scored 64 and below are `less healthy` and foods that scored 65 and above are `healthy`. Using the Ofcom NP model was the basis of the experimental FL in the form of a `food score` for this study.

Regardless of the influence of a FL the theory of food choice is complex and is comprised of multiple interacting factors that require consideration when determining adolescent eating behaviour. Food choices can be influenced by individual, social and cultural aspects which are further shaped by internal and environmental factors (Story et al., 2002; Ooi et al., 2015). By understanding the factors that govern adolescent food choices can allow for an effective modification of dietary patterns (Steptoe et al., 1995). Steptoe et al., (1995) developed a food choice questionnaire that methodically identified both health and non-health related factors that influence food choices decisions. The development of a multidimensional questionnaire allowed a direct comparison of the importance placed on each of the nine factors encompassing health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern which consisted of 36 items. Ooi et al., (2015) modified Steptoe et al`s., (1995) version specifically to determine food choice motives for Malaysian adolescents. Ooi et al`s (2015) food choice questionnaire identified six factors (health and nutrition knowledge, price and convenience, media, mood and sensory appeal, peers, and parents) which consisted of 36 items (Table 1).

The objective of this pragmatic study is to explore whether an experimental FL in the design of a nutritional `food score` when applied to food on offer in a secondary school setting could guide adolescents to select healthier food choices. However, the factors influencing adolescent eating behaviour are not fully understood because eating behaviour is multi-faceted. Using a food choice questionnaire this study intended to measure the importance adolescents placed on the factors that influence food choice behaviour and to evaluate if these factors require greater attention and integration into public health strategies that aim to reduce adolescent obesity.

2. Methodology

The study used a quantitative experimental design in which an intervention was implemented to evaluate if a change in food choice behaviour occurred. The target population for this research was adolescents, as there is a lack of previous research on this population group's food choices at school.

The characteristics were adolescents in English state secondary schools in London. The term `state` schools include community schools, foundation schools, and grammar schools controlled by the local government or academies run by a governing body (GOV.UK, ND). The term secondary school educates students between the ages of 12 and 16, students can go onto sixth form from the ages of 16 and 18 years old (Internations, 2020). The exclusion criteria consisted of special educational needs secondary schools because an individual's food choices may include a range of individual additional factors. The geographical area was identified as the boroughs in London (*n=33*) as they are accessible to the researcher. The four poorest boroughs in London were initially selected (Ealing, Brent, Newham and Barking & Dagenham) (London`s Poverty Profile, 2018). The link between poverty and childhood obesity is well documented (Webb et al., 2006; Gosis et al., 2016; Cohen, 2018) therefore, if the food score proved successful in changing adolescent food choice behaviour this would be an important finding for public health policies (Gosis et al., 2016). The study used non-probability typical case purposeful sampling (Fox et al., 2018) and the four boroughs' councils web sites were analysed to establish who operated the school catering provision.

The contract caterer that agreed to take part in the study nominated a school in Greater London that met the criteria. The criteria required the school to have a cashless payment system to record sales, to minimise additional operational work for the caterer, be a mixed gender school as the study sought to identify if there were gender differences in food choices, to obtain the client consent (the client is the contact between the school and the caterer), and to allow the study to be implemented in term one or term two. Term three (Easter to July) was not included in this research due to the number of pupils who would not be at school due to exam revision or were on work experience and therefore not using the school restaurant.

The caterer provided the school's three-week autumn menu cycle (Figure 1).

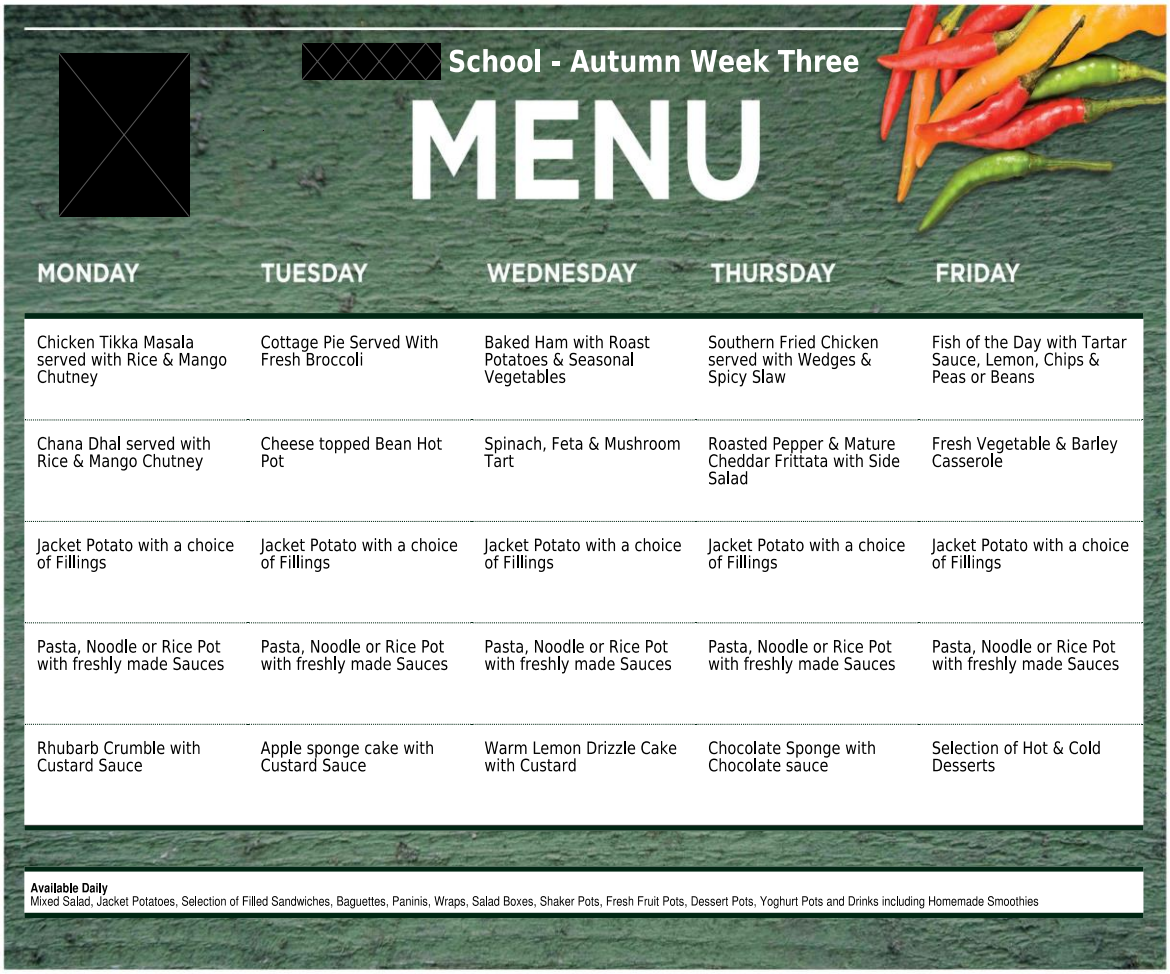

Figure 1 Autum week menu 3 of the selected school

Due to the limited space in the schools' restaurants not all food items could display a food score. The selected food items that displayed the food score had to meet the following criteria: the food item was in the top 20 highest sales from the previous menu cycle to reflect current eating behaviour and the food item had to be pre-coded into the till. The caterer's dietician provided a standardised recipe for each of the selected dishes on the menu. The nutritional information from the standard recipes was entered into the Diet plan 7 nutrition software package that created a breakdown of nutrients per 100g (foresoft.com, 2021) for each dish.

This study used the Ofcom NP model which was modified to score food from one to 100 with a score of one being the least healthy and a score of 100 the healthiest. When the breakdown of nutrients per 100g from Diet plan 7 were input into the Ofcom model this generated a food score for each selected dish on the menu cycle. The food score was the basis of the numerical nutritional FL which compared the average means of the food score from pre-intervention baseline, which took place in weeks one, two and three and at post-intervention phase one which were recorded in weeks four, five and six and

post-intervention phase two recorded in weeks seven, eight and nine. If the mean food score increased in the post-intervention phase one or post-intervention phase two the food score was successful in changing adolescent food choices to healthier options. If the mean score decreased or remained unchanged in the post-intervention phases, the food score was not deemed successful in changing adolescent food choices.

The caterer recorded daily sales for each dish on the menu cycle for the nine-week intervention. Weeks 1, 2 and 3 were recorded as pre-intervention baseline sales. No scores were visible to the pupils at this stage. The week (0) before the intervention began tutors received an `awareness pack` which contained a standardised tutor sheet to read to their tutor group on how the food score worked and each pupil had a `know your score` postcard. The message on the post card was `the higher the score the healthier the food choices`. When the intervention commenced the food scores were placed in holders on the sneeze screen above or beside each dish (Figure 1) and A3 posters, identical to the pupils' postcards, were displayed in the school restaurant (Figure 2). Pre-intervention baseline sales were compared to a repeat of the three-week menu cycle at post-intervention phase one (weeks 4, 5 and 6) and post-intervention phase two (weeks 7, 8 and 9). Sales were analysed to establish if the intervention influenced food choice behaviour and to evaluate if any effect would be sustained. It was hypothesised that the mean scores of the foods selected will increase after the application of the food score, that will indicate that pupils selected healthier food choices.

Figure 1. Food scores placed on the sneeze screen and next to the food items, to indicate the nutritional value, cards were relatively large to easily recognisable

Figure 2 indicates the A3 posters used on display to remind students about the nutritional value of the products and increase awareness

After the nine-week intervention pupils were requested to complete a four-part paper-based food choice questionnaire which were distributed through the form tutors and all educational years. Each pack contained a tutor guide for tutors to read out in tutor time and packs of questionnaires. Pupils were asked to complete the questionnaires during tutor time. After completion, each tutor collected and returned the questionnaires to a designated area that the client had organised at the school. As this was a paper-based questionnaire the researcher manually input the completed replies (*n=744*) into Bristol Online (now called Jisc). Part one requested sociodemographic data, part two asked lunch preferences, part three asked pupils to rank on the five-point scale, with five being the highest and one being the lowest whether they noticed the food score, and if they considered the food score influenced their food choices. Part four of the questionnaire asked participants to rank on the five-point scale which factors from the combined FCQ from Steptoe et al., (1995) and Ooi et al., (2015) (Table 1) had the greatest influence on adolescent food choice at school. Two additional questions were included. The literature identified that adolescents reveal that they are interested in nutrition, and that they understand that they should consume five portions of fruit and vegetables. This questionnaire wanted to ask the importance of food containing `*lots of fruits and vegetables*`. Hunger was also identified as a factor from the literature, therefore, how important was `*keeps me full*` was included. Each of the 21 questions started with `it is important to me that the food I eat on a typical day at school (tick one answer from the five-point scale from one being not important to five being very important from each line).` This quantitative data enabled the identification of any statistically significant differences in the importance adolescents place on factors affecting their food choice.

226 Table 1 Identifies the constructs and factors selected in each food choice motives questionnaire.

Steptoe et al., (1995)	*Ooi et al., (2015)*	*School Questionnaire*
Contains a lot of vitamins and minerals	Contains vitamins and minerals	Contains vitamins and minerals
Keeps me healthy	Keeps me healthy	Keeps me healthy
Is nutritious	Is nutritious	Is nutritious
Is high in fibre	Is high in fibre	Is high in fibre
Is high in protein	Is high in protein	Is high in protein
Is good for my skin/teeth/hair/nails		NA
Contains no artificial ingredients	Contains no artificial ingredients	NA
Is low in calories	Is low in calories	Is low in calories
Is low in fat	Is low in fat	Is low in fat
Helps me to control my weight	Helps me to control my weight	Helps me to control my weight
Contains natural ingredients	Contains natural ingredients	NA
Contains no additives		NA
Is cheap	Is cheap	Is cheap
Is not expensive	Is not expensive	NA
Is easily available in shops/supermarkets	Is easily available in shops/supermarkets	NA
Takes no time to prepare	Takes no time to prepare	NA
Can be cooked very simply	Can be cooked very simply	NA
Can be bought in shops near to where I live/study	Can be bought in shops near to where I live/study	NA
Is easy to prepare	Is easy to prepare	NA
Is good value for money	Is good value for money	NA
	Is the focus showed in the advertisement	NA
	Is as promoted in advertisement in the media	NA
	Is advertised in the media (television, radio internet etc.)	NA
	Is suitable for the image as advertised in the media	NA
Helps me cope with stress		Helps me cope with stress
Makes me feel good	Makes me feel good	Makes me feel good
Cheers me up	Cheers me up	NA
Helps me relax	Helps me relax	NA
Smells nice	Smells nice	Smells nice
Looks nice	Looks nice	Looks nice
Helps me cope with life	Helps me cope with life	NA
		Keeps me full
Tastes good	Tastes good	Tastes good
Keeps me awake/alert		Keeps me awake
Has a pleasant texture		Has a pleasant texture
		Includes lots of fruit and vegetables
Is what I usually eat		Is what I usually eat
Is familiar		Is familiar
Is like to food I ate as a child		NA
Comes from countries I approve of politically		NA
Has the country of origin clearly marked		NA
Is packaged in an environmentally friendly way		NA
	Is recommended by my friends	NA
	Is preferred by my friends	NA
	Similar to those consumed by my friends	Similar to those chosen by my friends
	Is encouraged by my friends	NA
	Is preferred by my father/mother	NA
	Is recommended by my father/mother	NA
	Is prepared by my father/mother	NA

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228 3. Results and discussion

229 Each of the selected 14 dishes on the menu cycle had a calculated food score. Each time a pupil
230 selected a dish the food scores were recorded to provide a daily score for each dish. The daily scores
231 were added together to provide a mean food score for each dish each week. If after the application of

the FL healthier food options (higher scores) were selected more frequently the mean food scores would increase. The differences in the mean food score before and after the application of the FL would indicate its effectiveness.

3.1. FL and effect on sale of items – real-time purchasing effect

As indicated in Table 2 from the nine weeks experiment the mean food score from pre-intervention baseline (weeks 1, 2 and 3) (43587.21) to post-intervention phase one (week 4, 5 and 6) (47473.93) increased by 3886.72 then decreased from post-intervention phase one (47473.93) to post-intervention phase two (weeks 7, 8 and 9) (46454.64) by 1019.29. The total increase in the food score from pre-intervention baseline to post-intervention phase two was 2867.43. Mauchly`s test indicated significance at 0.002, so the Greenhouse Geiser adjustment was used, and an ANOVA indicated that, although the mean suggests an upward trend, no significant difference was present ($F(2, 26) = 2.19$, $p > .05$). There is no literature that has evaluated the application of a food score to food on offer at a secondary school to compare to these findings.

Table 2 Indicates the Mean and Standard Deviation (SD) of the Food scores at baseline, three weeks, and six weeks for this school

Results for the School	*TIME 1 Pre-intervention Baseline Food Score (weeks one, two and three) 3 weeks*	*TIME 2 Post-intervention phase one Food Score (weeks four, five and six) 3 weeks*	*TIME 3 Post-intervention phase two Food Score (weeks seven, eight and nine) 3 weeks*
The Mean	43587.21	47473.93	46454.64
The Standard Deviation	(11961.31)	(8332.01)	(9126.66)

This research sought to detect if females reported noticing the food score more than males (Table 3) and if females self-reported that the food score affected their food choices more than males (Table 4). In the questionnaire pupils were asked to select (from a five-point scale) how much they noticed the food score from one, they did not notice to five, they did notice. Using the same scale, pupils were asked how much the food score affected their food choices from one, it did not affect my food choice to five, it did affect my food choices. From the 744 pupils' response to `Did you noticed the food score` then removing the incomplete data for gender declaration, 674 responses remained. Most pupils responded at either end of the scale and those answering 2-4, indicating uncertainty, were not included in the following analyses. From the 346 female responses, 198 (57.2%) selected score 1 meaning they did not notice the food score and 54 (15.6%) selected score 5 meaning that they did notice the food score. From the 328 male responses, 186 (56.7%) selected score 1 and 61 (18.6%) selected score 5. There was a non-significant association between pupils' gender and noticing the food score $\chi^2 (4) = 1.46$, $p > .05$ (Table 3).

Table 3 Indicates the gender and frequency of responses to each category of notice the food score

School	*Gender*	*% that selected Score 1*	*Number of responses*	*% that selected Score 5*	*Number of responses*	*Chi Square Value*	** Indicates Significant results*
	Females	57.2	198	15.6	54	1.46	
	Males	56.7	186	18.6	61		

3.2. FL and food choices

From the self-reported questionnaire fewer pupils responded to the question of whether the food score affected their food choices (Table 4). From the 661 pupils' response to `Did the food score affect your food choices` From the 339 female responses, 216 (63.7%) selected score 1 meaning it did not affect their food choices and 25 (7.4%) selected score 5 meaning that it did affect their food choices. From the 322 male responses, 216 (67.1%) selected score 1 and 19 (5.9%) selected score 5. There was a non-significant association between pupils' gender and pupils reporting that the food score had a perceived effect on their food choices χ^2 (4) = 1.36, p > .05.

Table 4 Indicates the gender and frequency of responses to each category of 'self-reporting if the food score `affected their food choices

School	*Gender*	*% that selected Score 1*	*Number of responses*	*% that selected Score 5*	*Number of responses*
	Females	63.7	216	7.4	25
	Males	67.1	216	5.9	19
	Mean		(216)		(16)

As the study by Hunsberger et al., (2015) identified not noticing a FL could be attributed to either adolescents' automatic non-cognitive behaviour or their lack of awareness could be due to the impact of the time pressured environment in a school restaurant. As a pupil in Hunsberger et al., (2015) stated *`nobody would really have time to stop right there and look at it because you have to keep on going`* (Hunsberger et al., 2015, p. 5). In addition, one pupil stated *`when we see it big, we want to know what that is because you notice it more`* (Hunsberger et al., 2015 p. 5).

The results from this study indicated that adolescents did not notice the FL and that the FL did not influence their food choices, yet other studies do identify adolescents do engage with a FL. Some studies identified that adolescents are high FL users (Haidar et al., 2017), others report that adolescents were frequent FL readers, with females being significantly higher than males, `use` was attributed to seeking price, expiry date and brand name (Saha et al., 2013; Talagala and Arambepola, 2016).

3.3. What adolescents think that matters in their food choice decision making

The research aimed to ascertain which of the 21 factors on the FCQ adolescents score as the most important (score five) and the least important (score one) with regard to influencing their food choices at school. Results indicated that the highest percentage of pupils scored the following factors at score five, 64.9% `tastes good`, 32.9% `keeps me full`, 29.9% `is cheap`, 29.2% `keeps me healthy`, 28.9% `looks nice`, 26% `smells nice`, and 25.2% `keeps me awake`. The factor that was identified as the least influential (score one) was 66.5% `is similar to foods chosen by my friends` and 31.3% `helps me cope with stress` (Table 5)

Table 5 indicates the factors that were identified as having the greatest influence of adolescent food choices at school

Factors influencing food choices at school					
Likert scale 1-5	1	2	3	4	5
Contains vitamins and minerals	18.5	13.3	30.8	19.7	17.6
Is nutritious	14.8	12.5	29.3	23.1	20.3
Is high in fibre	21.6	18.5	32.5	15.3	12.1
Is high in protein	17.7	16.2	30.5	21	14.6
Is low in calorie's	19.6	18	32	16.8	13.6
Is low in fat	19	17.1	31.1	18.7	14
Helps me control my weight	24	16.9	28.8	14.7	15.4
Keeps me healthy	12.9	9.6	23.5	24.8	29.2
Includes lots of fruit and vegetables	21.9	22.2	31.6	12.6	11.7
Is what I usually eat	17.9	15.1	29.9	20.8	16.3
Is cheap	15.4	12.7	22.8	19.2	29.9
Makes me feel good	15	12	28.9	21.1	23
Smells nice	15.3	12.1	21.2	25.4	26
Looks nice	10.8	9.5	22.6	28.3	28.9
Keeps me full	9	9	22.9	26.2	32.9
Keeps me awake	19.5	14.6	23.4	17.3	25.2
Has a pleasant texture	12.9	14	29.1	21.8	22.2
Helps me cope with stress	31.3	17.6	25.3	11.6	14.2
Tastes good	4.8	2.3	11.5	16.5	64.9
Is familiar	19	14.8	33.7	17.1	15.4
Is similar to foods chosen by my friends	66.5	15.1	13	3.2	3.2

In this study, the highest percentage of pupils (64.9%) scored taste at score five (Table 5) but the reasons for these results cannot substantiate the meaning of taste from this quantitative data. The literature agrees that taste is a predominant factor that influence adolescent food choices (Neumark-Sztainer et al., 1999; Shannon et al., 2002; Story et al., 2002; Fitzgerald et al., 2010; Ensaff et al., 2015;

Ronto et al., 2020; Bawajeeh et al., 2020; Gilmour et al., 2020). Shannon et al., (2002) stated that from the 294 returned surveys 93.7% of the participants select food due to the taste but the study did not identify what taste meant to them. Neumark-Sztainer et al., (1999) and Ensaff et al., (2015) identified taste was associated with familiarity, participants knew it tasted good because they had eaten it before, but familiarity was not a factor that was identified as important in this study. Ensaff et al., (2015) stated that taste and appearance were the principal factors in adolescent decision of food choices, yet the words used to express taste were vague such as `tastes good`, and food needs to have a `nice taste.` In a study by Gilmour et al., (2020), adolescents identified `taste preference` as the most significant intrapersonal factor that influenced their food choices and they identified two of the five flavours of `taste`; they liked carrots, broccoli, and cucumber due their `sweetness`, and they disliked peas, sprouts and cauliflower due to being slimy or `bitter`.

This study identified that 32.9% of adolescent rated `keeps me full` at score 5 (Table 5). The literature reports that healthy food is not synonymous with satiation with males (McKinley et al., 2005; Ronto et al., 2020; Gilmour et al., 2020; Voi et al., 2020; Azizan et al., 2021). However, no gender differences were investigated in this study. It is interesting to note that both Steptoe et al., (1995) and Ooi et al., (2015) food choice questionnaire did not include hunger as a relevant factor to consider in food choices.

This study identified that 29.9% of adolescent rated `is cheap` at score 5 (Table 5). However, the school had 5.4% who were eligible for free school meals, thus indicating that this school was middle class, therefore the importance of this factor could differ with a more diverse range of socioeconomic status schools.

In this school adolescents in this study (29.2%) identified the factor `keeps me healthy` was the fourth factor to score the highest at score five. Yet, all other factors as indicated in Table 5 that would be associated with health were not ranked as important. This study sought to identify if there was an association between gender in food choice and the importance placed on health because the literature advocated females are more influenced by health than males. Using the food choice questionnaire with the five-point scale `health and nutrition` encompassed nine factors; contains vitamins and minerals, is nutritious, is high in fibre, is high in protein, is low in calories, is low in fat, helps me control my weight, keeps me healthy, and includes lots of fruit and vegetables. Results indicated that there was a significant association between gender and specific health and nutrition factors. As can be seen in Table 6 from 689 pupils (361 female and 328 male) females' rate `keeps me healthy` significantly more highly than males $\chi 2(4) = 21.38$, $p < .05$, `contains vitamins and minerals` significantly more highly than males $\chi 2(4) = 10.4$, $p < .05$ and `is nutritious` significantly more highly

than males $\chi 2(4) = 11.17$, $p < .05$. In addition, females rate factors associated with health and weight and rate the factor `is low in calories` significantly more highly than males $\chi 2(4) = 9.62$, $p < .05$, ` and is low in fat` significantly more highly than males $\chi 2(4) = 11.09$, $p < .05$. It could be suggested that the word `health` is used to promote or identify the healthier food choices which may appeal to females.

Table 6 Indicates the significant association between gender and reporting on the importance placed on health when making food choices

School					
Gender	Factors				
Females	Contains vitamins and minerals	Is nutritious	Is low in calories	Is low in fat	Keeps me healthy

The results from this study identified that 66.5% of pupils identified that selecting food that `is similar to their friends` was not considered to be a factor that influenced their food choices and ranked this factor at a score of one (Table 5). Gilmour et al., (2020) focus group participants agreed with this finding and were adamant that they were individuals who made their own choices. However, as Story et al., (2002) identified that friends have an influence on behaviour by creating acceptable norms. Eating is deemed as socialisation and recreation. Simultaneously adolescents desire peer approval yet seek autonomy and individuality and believe that there is no influence from their friends. Other studies identified that friends did influence adolescent food choice behaviour. Individuals who selected healthier food choices were made to feel embarrassed or females were teased and were called weird (Verstraeten et al., 2014; Calvert et al., 2020). Consuming unhealthy foods expressed a belonging to the group which could be a protective factor thus highlighting the influence of friends on food choices (Salvy et al., 2012; Verstraeten et al., 2014; Watts et al., 2015; Chung et al., 2017). Gilmour et al., (2020) found an unusual relationship between peers and food choices at school. Participants articulated that they selected the same option of food. They explained that if they selected a big meal that is healthy and their friends selected fast food their friends would finish eating before they did, and that they would be left in the canteen eating on their own. It can be suggested that despite adolescents' belief that friends do not influence food choice behaviour evidence from the literature suggests otherwise.

4. Conclusion

A food score applied to food served in a secondary school in Greater London was not effective in influencing food choice behaviour. Only 15.6% females and 18.6% males noticed the food score and 7.4% females and 5.9% males stated that it influenced their food choices. There were no differences in gender as to noticing or self-reporting any effect of the food score on their food choices.

Adolescents rated sensory aspects of taste, appearance, and smell alongside hunger, keeping awake and price at score of five. Food choice and the importance placed on health was significantly associated more with females than males. The influence of friends was not reported to be a significant factor in adolescent food choice behaviour in this study.

Implications for gastronomy

School food has gone through a turbulent time regarding the portrayal of unhealthy food on offer. However, more recent school food standards have resulted in this contract caterer offering high quality main meals with high nutritional scores. The implication for gastronomy is to appreciate how to market school food as tasty and filling at an affordable price. It is well documented that school food is more often more nutritious than a packed lunch. Satiated children and adolescents' will be more receptive to learning, therefore caterers and the school need to work together to encourage a greater uptake of school meals which will be of benefit to both.

Declaration of interest

I can declare that for this paper titled `An experimental food label applied to food served at a secondary school in Greater London and its influence on adolescent food choices` have no conflict of interest.

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