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Evaluation of Food for Life

Pupil survey in local commission areas: Food for Life's impact on primary school children's consumption of fruit and vegetables

Full Report

Pupil survey in local commission areas: Food for Life's impact on primary school children's consumption of fruit and vegetables

October 2015

Authors: Mat Jones, Hannah Pitt, Liz Oxford, Issy Bray, Richard Kimberlee, Judy Orme

This study is part of the national evaluation of Food for Life 2013-15. The evaluation team is Mat Jones, Hannah Pitt, Liz Oxford, Judy Orme, Selena Gray, Debra Salmon, Issy Bray, Robin Means, Emma Weitkamp, Richard Kimberlee, and Jane Powell from the Public Health and Wellbeing Research Group at the University of the West of England, Bristol (UWE Bristol).

For further information about this report contact
Mat Jones matthew.jones@uwe.ac.uk / 01173288769

Public Health and Wellbeing Research Group
University of the West of England (UWE), Bristol
Bristol, BS164QY

Citation for this report:

Jones M, Pitt H, Oxford L, Bray I, Kimberlee R & Orme J (2015) *Pupil survey in local commission areas: Food for Life's impact on primary school children's consumption of fruit and vegetables. Full Report.* UWE Bristol.

Acknowledgements

We are very appreciative of the head teachers, staff and pupils who agreed to take part in this survey.

Note

The terms 'FFL school' and 'Engaged school' have been used in this report to describe schools that have achieved specific criteria and also enrolled onto the FFL programme. It is recognised that the extent of FFL activity by individual schools varies. The term 'Comparison' school has been used to describe schools that do not achieve the criteria set out and have not enrolled onto the FFL programme.

EXECUTIVE SUMMARY

Context

This research examined the impact of FFL local commissions on the diets of primary school pupils. It focused on fruit and vegetable consumption as national surveys show that children in England do not consume the recommended number of portions (Health Survey for England 2013), and daily intake of fruit and vegetables is a well-recognised indicator of a healthy diet. In the evaluation of phase 1 of FFL, the research found an increase in children's fruit and vegetable consumption in FFL flagship schools (Jones et al 2012). An important question is whether there is similar evidence of impact with the FFL programme as it scales up and further integrates with local strategic work.

Main research question and supplementary objectives

This research was designed to answer the question: *Do Year 4 and 5 pupils consume more fruit and vegetables in schools engaged with FFL than pupils in schools not engaged with FFL?*

Supplementary objectives sought (a) to determine whether the FFL programme is associated with pupil reported school meal take up, positive perceptions of food in school and experiences of cooking (b) to test whether progression from scheme enrolment to bronze and silver FFL awards, are predictive of outcomes and (c) to identify outcomes for each locally commissioned area.

Research methods

The research design was a cross sectional study in which schools engaged with FFL were compared with schools not engaged in the programme. FFL schools and Comparison schools were matched in the same local authority area by Free School Meal eligibility quintile and size. The survey covered pupils in Years 4 and 5. Pupil diets were measured using the Day in the Life Questionnaire (DILQ), a validated questionnaire specifically designed to measure fruit and vegetable consumption in children in a school setting. DILQ is identified as a suitable tool in Public Health England's Standard Evaluation Framework for Dietary Interventions (PHE, 2013). Additional measures in the questionnaire asked pupils about their perceptions of food in school and related food activities.

The survey took place in five FFL local commission areas; A, B, C, D and E. The survey had a total of 47 schools (FFL schools=24; Comparison schools =23) and 2411 pupils (total FFL pupils =1265; total Comparison pupils=1146). Pupils in the FFL and Comparison school groups, showed similar characteristics in terms of age, gender, the total number of children on roll and Free School Meal Eligibility (FSME) at school level.

Findings

1. Pupils in **FFL schools consumed more portions of fruit and vegetables** than pupils in comparison schools (FFL mean=2.03; comparison mean=1.54; p=0.000). Pupils in FFL schools therefore reported **consuming almost one third more** (2.03/1.54) than pupils in Comparison schools.

2. Pupils in FFL schools ate significantly more fruit and vegetables in school (FFL mean=1.24; comparison mean=0.89; p=0.000). They also ate significantly more fruit and vegetables **at home** (FFL mean=0.79; comparison mean=0.65; p=0.000).

3. After adjusting for FSME, gender and local authority variation, pupils in **schools engaged with the FFL programme were twice as likely to eat five or more portions of fruit and vegetables per day** OR=2.07, p=0.000, CI (1.54, 2.77), they were also about 60% more likely to eat more than the national average of 2.55 portions per day; OR=1.66, p=0.000, CI (1.37, 2.00).

4. Across the whole survey, a **large proportion of pupils reported eating no fruit and vegetables** in the day prior to the survey. However the groups were different: 23.4% of pupils in FFL schools and 33.9% of pupils in comparison schools were recorded as eating no fruit and vegetables.

5. For fruit and vegetable **intake there was a significant difference between pupils in bronze and silver schools** (bronze, mean=1.97; silver, mean=2.18, p=0.028). Pupils in silver FFL award schools were over twice as likely to eat 5 or more portions of fruit and vegetables compared to pupils in schools with no FFL award, i.e. both Engaged schools with no award and Comparison schools (15.6% compared to 6.7%).

6. School meal take up, based upon pupil reported of meals in the week prior to the survey, was 56.1% in FFL schools and 49.9% in comparison schools, a 6.2 percentage points difference that was significant, p=0.045. **In FFL schools, 6.0% more** pupils **had had at least one school meal** in the week prior to the survey (FFL: 70.0%, Comparison: 64.0%, p=0.008).

7. **School meal take up was associated with higher fruit and vegetable consumption for** pupils **in FFL schools**. By contrast, fruit and vegetable consumption was not associated with school meal take up in the Comparison schools. This could be a reflection of greater provision of fresh fruit and vegetables in school meals in FFL schools than Comparison schools.

8. After adjusting for gender, FSME and local authority differences, pupils **in FFL schools were about 40% more likely to 'like' or 'really like' school meals**: OR=1.43, p=0.00, CI (1.71, 1.75). Pupils in FFL schools were also significantly more likely to give a positive rating of school lunchtime in their school (p = 0.005).

9. Analysis at the level of local commissions showed a **positive impact on the *primary study outcome measure i.e. s***elf-reported portions of fruit and vegetables (FV) consumed and related sub-measures **in local commissions C and E. This impact was evident for most of the same measures in local commission B**. Positive outcomes for **local commission D** were found when the analysis focused on the differences between schools that had an FFL award and schools with no award. In **local commission A** analysis produced mixed findings with respect to associations of the FFL programme with pupil reported school meal take up, perceptions of food in school and experiences of cooking.

10. Various factors may explain the inconsistent evidence of positive outcomes at local commission level. While it was not possible to evaluate these three factors appear important; infrastructure based factors; social factors and; resources available to each commission.

11. While the DILQ was used in accordance with the author's instructions, it is recognised fruit and vegetable consumption could be under recorded since composite foods are not included. This could be relevant to FFL given the focus on including fruit and vegetables as part of composite dishes in school meals. Further research is needed to investigate if an adapted DILQ tool can assess composite dishes and/or have access to recipes used in school meals.

12. Supplementary dietary analysis was conducted for the local commission C survey sample. The analysis found no difference in the consumption of sweet snacks and savoury (salty) snacks in school or out of school. Pupils in comparison schools consumed significantly more servings of high energy drinks out of school compared to pupils in FFL schools ($p=0.002$) while differences in consumption of high fat food only just reached significance ($p=0.045$) for pupils in FFL schools.

Discussion, recommendations and conclusions

Whilst it is important to recognise possible residual confounding by socio-economic and other factors, this study found that the mean for daily fruit and vegetable consumption was significantly higher for Year 4 and 5 pupils (aged 8-10) in FFL schools compared to pupils in schools not engaged with the programme.

This study suggests that **schools engaged in the FFL programme provide an important opportunity for 8-10 year olds to consume fruit and vegetables.**

Fruit and vegetable consumption for pupils in FFL schools was not only higher within school time; it was also higher at home. FFL and commissioners can draw upon this finding to examine the potential 'spill over' of the programme from the school to the home, and the extension of impact into the wider community.

Progression to a bronze and silver award is linked with higher fruit and vegetable consumption. The Food for Life School Award framework could be used as an indicator for key food related outcomes and can provide a proxy for positive dietary behaviour.

The findings indicate that **achievement of the FFL Catering Mark is a driver for improving fruit and vegetable consumption.**

There are differences in specific outcomes at the level of each local commission. These provide a base for valuable learning across commission areas and add to our understanding of how external factors can limit the progress of local commissions.

The Day in the Life Questionnaire (DILQ) is **a practical tool for assessing fruit and vegetable consumption and has the potential to be used in future evaluation of FFL commissions.**

1. INTRODUCTION

The promotion of healthy child weight is a national public health priority in England (PHE, 2014), and an area of considerable activity at the local level. One of the programmes being commissioned by local authorities as part of their activity to improve child health is Food for Life (FFL). FFL is a coalition of five charities working to deliver change in food culture across English schools through four key areas of activity: Food Leadership and School Food Culture, Food Quality, Food Education and Community and Partnerships. Schools can apply for awards that recognise their progress towards embedding a positive food culture across their school. The partnership provides training, resources and advice to support them in this process. In areas where FFL has been commissioned investment enables a selection of schools to receive more intensive support including free training and support from FFL staff.

Phase 1 evaluation of the Food for Life Partnership (FFLP)[1] by the University of the West of England (UWE) found that participation in the programme was associated with increased fruit and vegetable consumption in primary school settings (Jones et al, 2012). The Phase 1 study was conducted with schools receiving an intensive level of support under FFLP's flagship scheme. Since then, FFLP has introduced a delivery model which focusses on local commissions with geographically concentrated activity in a number of local authority areas.

The Public Health and Wellbeing Research Group at the University of the West of England has been engaged to evaluate the impact of the FFL programme in Phase 2, including its locally commissioned activities. Research to date has highlighted the need for better understanding of the impacts of FFL activity on school pupils, in particular behaviours related to healthy diet and lifestyles. FFL's monitoring processes need to collect further evidence of the programme's impact on pupils in order to demonstrate the public value of local commissions. Stakeholders have highlighted a need for evaluation of FFL's impacts on pupils and for tools that can effectively monitor this in future. Commissioners are particularly interested in knowing how FFL influences pupil attitudes and behaviour in relation to healthy eating as in the long term this has potential to benefit their diet and weight (Pitt and Jones 2014). Evaluation of Phase 2 of the programme will be able to test whether changes in dietary patterns are evident within the context of the locally commissioned programme.

Evidence shows that fruit and vegetable consumption is an important part of a healthy diet, protects against diet-related disease and contributes towards healthy weight (Fung et al, 2008; He, Nowson & MacGregor, 2006; Hu, 2003; Montonen et al, 2004; Rolls et al, 2004, WRCF and AICR, 2007). Food-related ill health is responsible for about 10% of deaths and illness, costing the NHS about £6 billion annually (Rayner and Scarborough, 2005).The vast majority of this burden is due to unhealthy diet. Health problems associated with being overweight or obese cost the NHS more than £5 billion every year (DH, 2015).

Fruit and vegetable consumption is associated with increased consumption of fresh, seasonal and - depending on the context – local and ethically sourced foods. But surveys have shown that the majority of children do not consume the recommended amount of fruit and vegetables (HSE, 2013). According to the latest Health Survey for England, there was an increase in the proportion of children consuming five or more portions per day from 2005,

[1] Food for Life was previously called the Food for Life Partnership (FFLP)

and prevalence has fluctuated at around 19% - 21% for boys and 20% - 22% for girls between 2006 and 2010. Since then, the prevalence has dropped to the 2005 levels, with the latest survey reporting an average of 2.55 portions eaten a day by 8-10 year olds (ibid.).

A systematic review of research into the effectiveness of a whole school approach to health promotion found that it can have a positive influence on levels of fruit and vegetable consumption (Langford et al 2014). Pupil consumption of fruit and vegetables is therefore a central indicator for the FFL programme's impact on food culture and the benefits to public health and wellbeing. Discussion with local commissioners by Pitt and Jones (2014) highlighted that pupil fruit and vegetable intake is a useful and appropriate indicator of whether food related activity in schools is having a positive effect at the individual level.

2. STUDY AIMS

The main aim of the study is to assess the impact of engagement with the FFL programme in local commissions on pupil's fruit and vegetable consumption and to answer the research question: *Do Year 4 and 5 pupils consume more fruit and vegetables in schools engaged with FFL than pupils in schools not engaged with FFL?*

The study also provided opportunities for understanding additional impacts of the programme. These include:

- School meal take up self-reported by pupils in the week prior to the survey
- Pupil attitudes towards school meals and the school lunch period overall
- Pupil self-reported cooking in the week prior to the survey

Further analysis aimed to test whether FFL award status is predictive of outcomes and to identify outcomes for each locally commissioned area. The study also aimed to provide a robust data source for further analysis of local commissions including SROI analysis, collect information on pupil perceptions of food in school, provide a baseline for potential follow up evaluation and comparison in future, and inform the development of tools and measures for FFL and local commissions for on-going monitoring and evaluation of pupil behaviour. Figure 1 provides a summary of the main outcome measures and descriptive information underpinning the study.

Figure 1 Summary of descriptive information and outcome measures used in the study

General descriptive information
Total number of children on roll at each school
Free School Meal Eligibility % (FSME)
Criteria to determine FFL engagement
Age and gender of children

Primary study outcome measures
Self-reported portions of fruit and vegetables (FV) consumed
Sub-measures including: FV total ,FV at school, FV out of school, total fruit, total vegetables, total FV plus juice (1 serving max)

Secondary study outcome measures
Self-reported number of school meals eaten in a week
Self-reported views about school meals and the lunchtime period

Self-reported frequency of cooking in the previous week Self-reported consumption of sweet and savoury (salty) snacks, high fat foods and and high energy drinks snacks [for a study sub-sample]

FFL takes a whole school approach to changing school food culture which reflects the principles of the Ottawa Charter for public health promotion by taking a whole setting approach (Orme et al 2011: 9). It is expected to have a positive impact on pupils' health by directly or indirectly influencing their diet, for example by increasing the proportion of fresh fruit and vegetables offered in school meals and increasing the number of children choosing to eat these. Although focused on food in schools, FFL also aims to engage parents in food related activity and to have an impact on the wider community through schools (Orme et al, 2011: 33). Previous evaluation found that some parents of primary school children involved in FFLP activity made changes to the food consumed and adopted healthier eating practices at home (Orme et al, 2011: 146). Parents of pupils in FFL schools gain awareness of issues around healthy food choices, and may become more able to provide their children a healthier diet at home. It may be expected that pupils from FFL schools consume more healthy foods outside school.

Although FFL partners and commissioners recognise the complexity of food related behaviours and the time it can take to influence them it is expected that within the lifetime of a local commission there would be some demonstrable impact at the pupil level (Pitt and Jones 2014). This assumption has not been thoroughly tested to date and is the focus of this research.

3. RESEARCH DESIGN & METHODS

The study design builds upon elements of the cross-sectional study reported by Keyte et al (2012) which evaluated the impact of the National Healthy Schools Programme (NHSP) in South West Hampshire. This found that "after adjustment for free school meal eligibility (as a measure of socio-economic status) and gender, pupils attending schools engaged with NHSP were twice as likely to eat 2.5 portions of fruit and vegetables or more per day". The advantage of using a cross-sectional study design in the context of the Phase 2 FFL Evaluation is that it can produce results within the time schedule required and identify associations with the programme delivery. A before-and-after study was prohibited by reporting deadlines and for stakeholders' requirements for evidence to inform decisions on future commissioning.

3.1. Categorisation of FFL schools and Comparison schools

The research compares pupils in schools engaged with FFL in a commissioned area with those that are not. The flexibility of FFL as an intervention and diversity of ways in which schools can engage with the partnership means that there is no established definition by which 'FFL schools' can be identified. In discussion with FFL staff we devised criteria for categorising schools as a FFL school (Engaged school) or Comparison school. This takes into account the actions required to embed a positive food culture across school life according to FFL guidance and previous evaluation of the impacts of FFL activity. It also takes into account of the fact that schools may be engaged with initiatives other than FFL, which similarly support them to influence pupils' diet and health. The criteria recognise that schools may have engaged with FFL in the past but no longer do so, hence the requirement to report recent activity.

Categorisation as a FFL school ('Engaged' school) required 4 or more of the following criteria to be achieved:

- hold a current FFL award (bronze, silver or gold),
- run cooking, growing and/or farm visit activities for pupils within class teaching,
- have participated in FFL training session(s) within the last year,
- have hosted FFL training session(s) or event(s) within the last 3 years,
- have a designated FFL co-ordinator,
- consult with pupils about school food at least termly,
- have received one-to-one guidance (by phone/email/in person) from FFL staff within the last year,
- have a food policy or action plan written or revised within the last 3 years.

Schools which did not report 4 or more of these criteria were categorised as potential 'Comparison' schools.

3.2. Sampling strategy

Following a similar approach set out by Keyte et al (2012) for one local authority with regard to the National Healthy Schools programme, we sought to recruit five FFL schools and five Comparison schools in five local authority areas with a current FFL local commission, in place for at least 12 months. They also represented both rural and urban authorities, and all of the English regions where FFL local commissions currently operate.

Selection and recruitment followed a systematic process. FFL staff in each local commission area were asked to identify at least 10 FFL 'Engaged' schools according to the criteria above (see 3.1). In nearly all cases the clearest indicator of engagement was a current FFL award (bronze or higher). For a small number of instances FFL staff nominated schools that had not achieved an award, but had been a focus for engagement under the local commission contract and achieved other criteria.

From this group of FFL Engaged schools, five were selected by list number and invited to participate in the research. Where a school declined, the next school listed was invited to participate. Comparison schools were selected from a list of all remaining primary schools in the local authority by matching the school size (i.e. total number of children on roll) and proportion of pupils with free school meal eligibility (DE, 2015) with the FFL Engaged schools. Sampling therefore followed a process that sought to reduce sources of selection bias and to optimise the match between two groups. Appendix 1 provides a worked example of the selection and recruitment process.

A letter was sent to the head teacher of each selected school detailing the study and requesting participation and this was generally followed up with a telephone call. Headteachers (or a nominee) who consented to participate completed a brief questionnaire regarding their school's FFL related activity in order to confirm their level of engagement in the FFL programme against the criteria. Headteachers either acted in loco parentis or sent letters to parents/guardians requesting consent for their child to participate.

3.4. Data collection with pupils

At participating schools all children in Years 4 and 5 (aged 8–10 years) were invited to take part. At each school visit a guidance and checklist form was used during data collection to ensure a consistent approach. Pupils were told that the aim of the research was to investigate how they spent

the previous school day, including whether they had watched television, what they had done after school, and what they had had to eat and drink. They were given verbal instructions about completion of the questionnaire. Pupils were asked whether they were happy to complete the questionnaire or whether they would prefer to do an alternative activity, such as reading a book. The questionnaire was carried out as a classroom exercise with the class teacher, researcher (and where relevant, teaching assistant) present. Pupils were advised that they could ask for help reading the questions or for clarification of their meaning.

3.5. Questionnaire

The Day in the Life Questionnaire (DILQ) is a validated questionnaire, utilising the 24-h recall method of collecting dietary information, specifically designed to measure fruit and vegetable consumption in primary school aged children (Edmunds & Ziebland, 2002). DILQ is identified as a suitable tool in Public Health England's Standard Evaluation Framework for Dietary Interventions (PHE, 2012). The questionnaire asks participants to recall everything that they had done the day before and, to minimise recall bias, does not focus solely on food and drink consumed.

To ensure that the tool elicited appropriate and accurate information to meet the objectives of the study and was clearly understood by researchers, the questionnaire was piloted with two classes of children who were drawn from the same age group as the target population. This led to some refinement to the administration of the questionnaire with classes. Otherwise the process followed the standard DILQ guidance.

Strictly applied, the DILQ does not quantify the consumption of fruit and vegetables in terms of portion size. At the point of coding, no attempt is made to estimate the portion size. Rather, its main utility is in determining differences in fruit and vegetable intake at group level, so measurement of portion size is not essential. However, a number of studies have interpreted counts of fruit and vegetables as 'portions' at the point of reporting (e.g. Keyte et al, 2012). In this report we follow this convention, or use the phrase 'DILQ portion' for clarity. When interpreted as portions, the results might be considered conservative because they do not include some dietary sources of fruit and vegetables. In accordance with the author's recommendations on the use of the DILQ, composite foods (such as lasagne, shepherd's pie) are not included.

Since the initial validation of the DILQ tool, researchers have used DILQ to record and report additional foods consumed, including snacks and high fat foods (Kipping et al, 2014). In this study we recorded all references to 'juice' (including 'smoothies'). In addition, for one local commission area sub-sample, we piloted the use of the questionnaire for recording high energy drinks, sweet and savoury (salty) snacks, high fat foods and high energy drinks.

To meet the needs of FFL and its' commissioners additional questions were added to the DILQ to gain feedback from pupils regarding school meals and mealtimes. These were based on questions previously used in FFL activities with pupils. A final question was added to determine whether children regularly help an adult to cook a meal to give an additional measure of changes in pupil behaviour related to FFL activity.

The questionnaire was designed to be attractive and comprehensive to pupils in the target age group, and to be completed within 20 minutes. Pupils were not asked to write their name on the questionnaire.

3.6 Data analysis

Data written on the questionnaires was inputted manually on to an Excel template by four UWE MSc Public Health students, following training to adopt a standardised approach. Reported food consumption was coded according to guidance for use of the DILQ to create a value for each pupil's daily fruit and vegetable consumption. The data were then exported to SPSS, Version 20 (IBM, 2015). Drawing upon a list selection of 1 in 10 questionnaires, 5% of the sample was inter-rater reliability checked by the FFL Evaluation Officer.

The survey included some classes with mixed Year 3/4 and Year 5/6 groups. This resulted in a small number of pupils aged 7 and 11 completing the questionnaire. These pupils/cases were excluded from the analysis. Other exclusions included largely incomplete questionnaires (usually where a pupil had to leave the class during the completion of the questionnaire). Missing data for gender and age was imputed using the rule of the entering same gender or age as the preceding case in the dataset. This rule was applied for 26 respondents.

The assessment of outcome variables was achieved using an Independent Samples T test. Binary logistic regression was used to determine odds ratios after controlling for potential confounders.

All research data was stored and processed in accordance with the Data Protection Act 1998. The research protocol secured ethical approval from the University of West of England's Ethics Committee.

4. FINDINGS: ALL SURVEY AREAS

4.1 Study population

The main analysis presented here in section 4 includes 47 schools. Data for one additional school arrived outside of the main data collection period but has been included in the reported findings for local commission A.

4.1.1. Local commission areas and participating schools

Participating schools were in five local authority areas with a current FFL local commission. Table 1 shows the breakdown of the areas by school engagement and pupil participation.

Table 1. Characteristics of schools by local authority area (n=2411)

Local authority location of school	Number of Schools: Group	Number of pupils participating in the study	Number of pupils participating in each local authority location
A	5: FFL	296	428
	3: Comparison	132	
B	5: FFL	267	555
	5: Comparison	288	

C	5: FFL	258	487
	5: Comparison	229	
D	5: FFL	215	445
	5: Comparison	230	
E	4: FFL	229	496
	5: Comparison	267	
Total	FFL	1265	2411
	Comparison	1146	

There were no significant differences in the size of school (total number of pupils on roll) or Free School Meal Eligibility% between FFL and Comparison schools suggesting the groups were reasonably matched with reference to these parameters (See Appendix 3). The mean FSME for FFL schools was 18.9% (SD 13.6) and the mean FSME for Comparison schools was 17.2% (SD 13.0) (Appendix 3). In addition, there were no significant differences in the size of school or FSME between local authority areas (Appendix 3).

4.1.2. Characteristics of pupils

The total number of children included in the study was 2411. The age range was 8 to 10 years old and the study population included approximately equal numbers of boys and girls. The number of pupils eligible for a free school meal (FSME%) is used as a proxy measure for socio-economic status. Using national FSME quintiles, pupils numbers broadly reflected the national distribution, although there were fewer in the 2nd FSME quintile (11.8%).

Table 2: Characteristics of pupils in the whole study sample (n=2411)

	Number (%) of pupils participating
Gender	
Boy	1240 (51.4)
Girl	1171 (48.6)
Age	
8	762 (31.6)
9	1161 (48.2)
10	488 (20.2)
Socio-economic status (FSME Quintile)*	
Top quintile (41.6%+)	438 (18.2)
2nd quintile (25.5-41.5%)	285 (11.8)
3rd quintile (15.7-25.4%)	606 (25.1)
4th quintile (9.3-15.6%)	484 (20.1)
Bottom quintile (0-9.2%)	598 (24.8)
Attending a school engaged with FFL?	
Yes	1265 (52.5)
No	1146 (47.5)

Attending school with a FFL award?	
No award	1293 (53.6)
Bronze	632 (26.2)
Silver	486 (20.2)

* Socio-economic status as defined by percentage of free school meal eligibility of school (FSME %) FSME quintiles are calculated nationally by ranking the FSME% data for all schools and then splitting this data into five sub-groups, each representing approximately 20% of all schools. The schools in the top quintile have 41.6%+ of FSME pupils.

4.2 Fruit and vegetable consumption of pupils in the study

4.2.2 Fruit and vegetable consumption of pupils participating in the study

Table 3 shows that for the study population the mean DILQ portions for total fruit and vegetables intake was 1.80. More than half (59%) of fruit and vegetables are consumed in school. Fruit makes up the greater share (59%) of total fruit and vegetables in reported consumption.

Mean fruit and vegetable consumption in this survey was less than the mean of 2.55 portions reported in the most recent Health Survey for England for this age group (HSE, 2014). This is likely to be due to the measurement characteristics of the DILQ tool that does not take into account juice and fruit and vegetables in composite foods. If juice is included in the analysis, mean fruit and vegetable consumption increases from 1.80 to 2.37. This is closer to the national survey average.

Table 3. Fruit and/or vegetable consumption in the total study population (n=2411)

Consumption		Min - Max	Mean DILQ portions	Std. Deviation
Vegetables in school		0 - 4	.38	.60
Fruit in school		0 - 5	.69	1.01
Fruit & vegetables in school		0 - 6	1.07	1.17
Vegetables out of school		0 - 4	.34	.59
Fruit out of school		0 - 6	.38	.68
Fruit & vegetables out of school		0 - 7	.73	.94
Total vegetables		0 - 6	.76	.94
Total fruit		0 - 8	1.07	1.52
Total fruit & vegetables		0 - 9	1.80	1.83
Total fruit & vegetables (including max. of 1 serving of juice)		0 - 10	2.37	1.95

Using the unadjusted DILQ portion, Table 4 shows that 9.5% (n=230) of pupils reported eating the recommended five plus portions of fruit and vegetables per day. Table 4 also shows that 28.4% (n=684) reported eating no fruit or vegetables at all during the 24 hours prior to the survey. Supplementary analysis showed that 51.7% of children reported eating no fruit or vegetables at home (breakfast/before school, or after school/evening meal/before bed).

The pattern of frequencies is lower than the recent HSE survey conducted in 2013 and probably reflects the conservative character of the DILQ tool.

Table 4. Total DILQ portions in the study population (n=2411).

DILQ portions	Frequency	%
0	684	28.4
1	654	27.1
2	396	16.4
3	262	10.9
4	185	7.7
5+	230	9.5
Total	2411	100

The association between DILQ portions consumed and other variables was tested:

- Age was not significantly associated with fruit and vegetable consumption (p=0.082).
- Girls report eating significantly more fruit and vegetables than boys (Girls: mean=2.10; Boys: mean=1.52; p=0.00).
- Fruit and vegetable consumption is associated with FSME% (p=0.00): Pupils in schools with higher FSME consumed less fruit and vegetables than those in schools with a lower FSME.
- Mean DILQ portions varied between local authority areas. It was highest in local commission B (mean=2.10) and lowest in local commission D (mean=1.50) (p=0.003).

4.2.3 Fruit and vegetable consumption in FFL Schools and Comparison schools

A key research question was to determine if pupils attending a school engaged with FFL consumed more fruit and vegetables than those children attending a school not engaged with FFL.
Table 5 summarises the findings and shows that pupils in FFL schools were significantly more likely to consume more portions of fruit and vegetables than in comparison schools (p>0.001). This difference is also evident for all sub-measures for fruit and vegetable consumption, apart from vegetable consumption out of school.

There are a number of ways in which these data can be interpreted. For example, for total fruit and vegetable consumption, pupils in FFL schools report consuming almost one third, or over half a DILQ portion more than pupils in Comparison schools (2.03/1.54).

Table 5. Mean fruit and/or vegetable consumption in FFL and Comparison Schools for study outcomes (FFL schools: n = 1265, Comparison schools: n = 1146)

	FFL Engagement	Mean DILQ portions	Std. Deviation	T test*
Vegetables in school	FFL School	.46	.63	

	Comparison	.30	.55	*p* =0.000
Fruit in school	FFL School	.78	1.06	
	Comparison	.59	.94	*p* =0.000
Fruit & vegetables in school	FFL School	1.24	1.22	
	Comparison	.89	1.08	*p* =0.000
Vegetables out of school	FFL School	.36	.60	
	Comparison	.32	.58	*p* =0.174
Fruit out of school	FFL School	.44	.73	
	Comparison	.33	.62	*p* =0.000
Fruit & vegetables out of school	FFL School	.79	.99	
	Comparison	.65	.88	*p* =0.000
Total vegetables	FFL School	.86	.97	
	Comparison	.65	.90	*p* =0.000
Total fruit	FFL School	1.21	1.61	
	Comparison	.92	1.41	*p* =0.000
Total fruit & vegetables	FFL School	2.03	1.93	
	Comparison	1.54	1.68	*p* =0.000
Total Fruit and vegetables including a maximum of 1 serving of juice	FFL School	2.64	2.04	
	Comparison	2.07	1.79	*p* =0.000
Binary: 5 a Day (under 5 or 5 and over)	FFL School	1.12	.33	
	Comparison	1.06	.25	*p* =0.000
Binary: National average 2.55 (under or 2.55 plus portions)	FFL School	1.32	.47	
	Comparison	1.23	.42	*p* =0.000

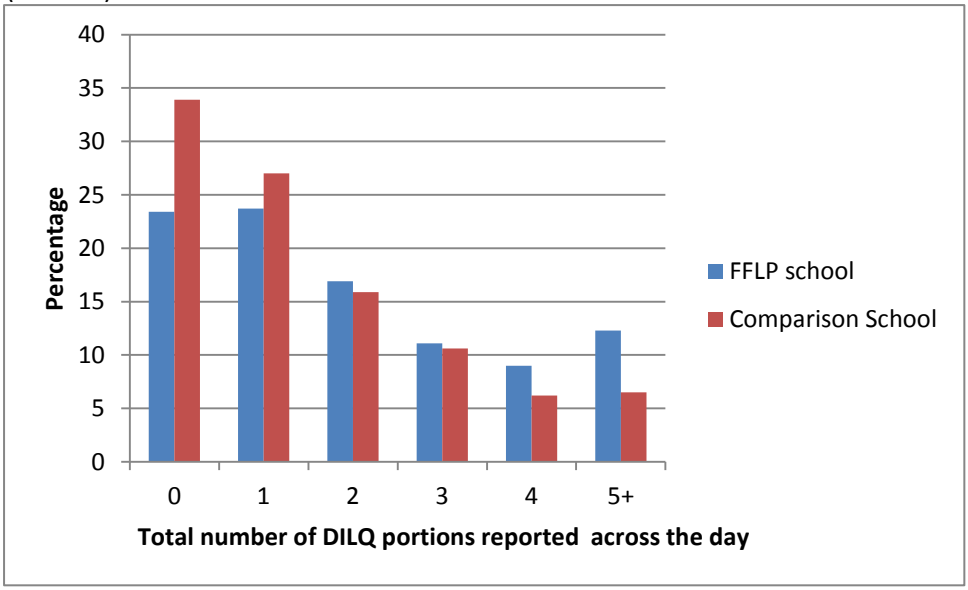
*Independent sample t-test for difference in means

Chart 1 shows the total reported consumption of fruit and vegetable DILQ portions by pupils in FFL and Comparison schools. It shows that:

- 12.3% of pupils ate 5 or more portions in FFL schools and 6.5% pupils ate 5 or more portions in Comparison schools.
- 23.4% of pupils in FFL schools and 33.9% of pupils in Comparison schools were recorded as eating no fruit and vegetables.

There is a modal difference of 1 portion between the groups, although the modal number of portions was low for both groups: 0 portions for Comparison schools and 1 portion for FFL schools. The median was 1 portion for both groups.

Chart 1: Total fruit and vegetable consumption by pupils in FFL and comparison schools (n=2411)



Further analysis across the course of the day showed that 49.6% pupils in FFL schools reported eating no fruit and vegetables at home, whereas this figure was 54.4% for pupils in Comparison schools.

Using binary logistic regression we sought to test the effect of FFL on pupil consumption of 5 or more portions of fruit and vegetable per day. The model controlled for FSME, gender and local authority area as potential confounders. We found that pupils in schools engaged with the FFL programme were twice as likely to eat five or more portions of fruit and vegetables per day compared to pupils in comparison schools (OR=2.07; p=0.000; CI=1.54-2.77).
The latest national data reports that pupils aged 8-10 eat an average of 2.55 portions of fruit and vegetables per day (HSE, 2014). After adjustment for FSME and gender, pupils in FFL schools were about 60% more likely to eat over the national average of 2.55 of fruit and vegetables or more a day (OR=1.66; p=0.000; CI=1.37-2.00).

4.2.4 Fruit and *vegetable consumption in schools with or without FFL award status*

A few schools 'engaged' with FFL local commissions did not have an FFL bronze or silver award. We therefore sought to assess the relationship between the main outcome and award status.

Total fruit and vegetable consumption, and the other sub-measures of fruit and vegetable consumption, were higher for pupils in schools with an FFL award than those without. The associations were all significant (p>0.05 for all measures).

We sought to assess whether there were differences in outcomes between schools with bronze and silver awards. The following table shows that the mean DILQ portions for bronze (mean=1.97) is lower than silver (mean=2.18). This difference is statistically significant

(p=0.028), although the differences for the other measures – fruit and vegetables in or out of school and inclusive of fruit juice – are not statistically significant.

Table 6: Fruit and vegetable consumption in FFL award schools

FFL award status		No.	Mean DILQ portions	Std. deviation
No FFL award (n=1293)	Fruit & vegetables in school	1183	.91	1.12
	Fruit and vegetables out of school	1183	.66	.88
	Total fruit and vegetables	1183	1.57	1.72
	Total Fruit and Veg plus max of 1 serving of juice	1183	2.10	1.83
Bronze award (n=632)	Fruit & vegetables in school	632	1.19	1.17
	Fruit and vegetables out of school	632	.78	1.01
	Total fruit and vegetables	632	1.97	1.86
	Total fruit and vegetables plus maximum of 1 serving of juice	632	2.56	1.98
Silver award (n=486)	Fruit & vegetables in school	486	1.37	1.24
	Fruit and vegetables out of school	486	.82	1.00
	Total fruit and vegetables	486	2.18	1.20
	Total fruit and vegetables plus maximum of 1 serving of juice	486	2.82	2.08

Chart 2: Total consumption of fruit and vegetables by pupils with FFL silver, bronze award or no award (n=2411)

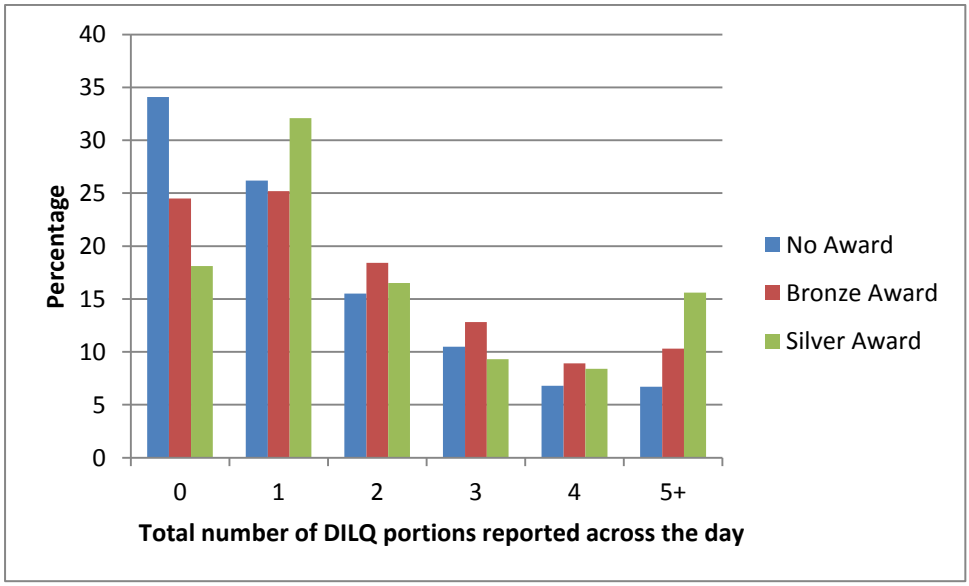


Chart 2 compares fruit and vegetable consumption for pupils in schools with silver, bronze and no FFL award. It shows some differences between the groups:

- Pupils in silver FFL award schools were over twice as likely to eat 5 or more portions of fruit and vegetables compared to pupils in schools with no FFL award (15.6%compared to 6.7%)
- Pupils in schools with no FFL award were almost twice as likely to consume no fruit or vegetables compared to pupils in silver FFL award schools (34.1% compared to 18.1%)
- Approximately one and a half more times more pupils in FFL silver award schools ate 5 portions or more a day of fruit and vegetables compared to those in FFL bronze award schools (15.6% compared to 10.3%)

It should be noted that for all three groups, fruit and vegetable consumption is skewed towards low consumption (0 or 1 portion) in these data, a pattern that is likely to reflect the measurement characteristics of the DILQ tool.

4.3 School meal take up

Pupils were asked to record how many times, from 0 to 5, they had had a school meal in the last week. School meal take up was calculated by dividing the total number of meals recorded by the number of meal opportunities (n x 5 days). Using this calculation:

- School meal take up in FFL schools was 56.1% (n=1255, sum=3522, mean=2.81, SD=2.23)
- School meal take up in Comparison schools was 49.9% (n=1137, sum=2834 mean=2.49, SD=2.25)

This is a difference of 6.2 percentage points. An independent means t-test found that this difference was significant (p=0.045).

A further approach to understand take up is to measure the percentage of pupils that had at least one school meal in the last week. Using this calculation:

- 70.0% of pupils in FFL schools had at least one school meal in the last week (n=1255)
- 64.0% of pupils in Comparison schools had at least one school meal in the last week (n=1137)

This is a difference of 6.0 percentage points. An independent means t-test found that this difference was significant (p=0.008).

Table 7 shows that school meal take up was associated with higher fruit and vegetable consumption with all measures for pupils in FFL schools. By contrast, fruit and vegetable consumption was not associated with school meal take up in the Comparison schools.

Table 7. Fruit and vegetable consumption and school meal take up: Analysis by FFL Schools and Comparison Schools

FFL Engagement / Fruit & Vegetable Measure		School Meal Take Up	No.	Mean DILQ portions	Std. Deviation	t test*
FFL schools	Fruit & vegetables in school	Zero school meal	379	1.11	1.16	
		1 or more school meal last week	876	1.31	1.25	*p*=0.008
	Total fruit and vegetables	Zero school meal	379	1.86	1.87	
		1 or more school meal last week	876	2.12	1.95	*p* =0.029
	Total fruit and vegetables plus maximum of 1 serving of juice	Zero school meal	379	2.48	1.99	
		1 or more school meal last week	876	2.72	2.06	*p* =0.059
	Binary: 5 a Day (under 5 or 5 and over)	Zero school meal	379	1.10	.30	
		1 or more school meal last week	876	1.13	.34	*p* =0.090
	Binary: National Average 2.55 (under or over 2.55 portions)	Zero school meal	315	1.37	.48	
		1 or more school meal last week	647	1.47	.50	*p* =0.003
Comparison schools	Fruit & vegetables in school	Zero school meal	364	.91	1.14	
		1 or more school meal last week	663	.86	1.05	*p* =0.475
	Total fruit and vegetables	Zero school meal	364	1.59	1.75	
		1 or more school meal last week	663	1.50	1.67	*p* =0.409
	Total fruit and vegetables plus max of 1 serving of juice	Zero school meal	364	2.20	1.87	
		1 or more school meal last week	663	1.99	1.76	*p* =0.080
	Binary: 5 a Day (under 5 or 5 and over)	Zero school meal	364	1.08	.27	
		1 or more school meal last week	663	1.06	.23	*p* =0.166
	Binary: National average 2.55 (under or 2.55 plus portions)	Zero school meal	340	1.36	.48	
		1 or more school meal last week	608	1.31	.46	*p* =0.099

*Independent sample t-test for difference in means

4.4 Other outcomes linked to engagement with FFL

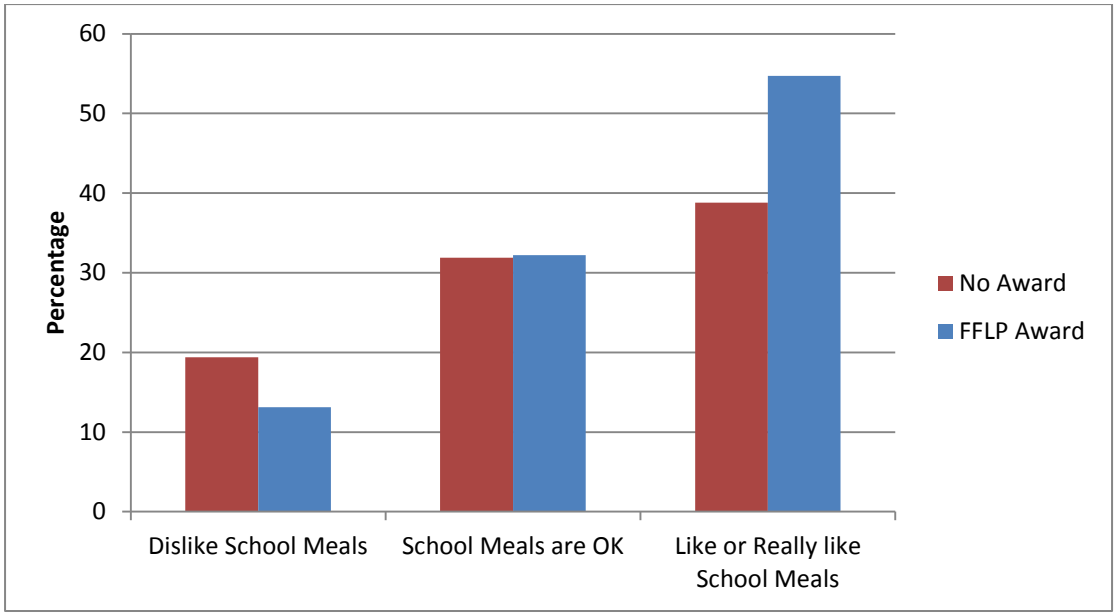
4.4.1 Attitudes towards school meals

Chart 3 presents pupil views on school meals. This includes pupils who do and do not currently have school meals. It shows that 54% of pupils in schools with a FFL award 'Quite like' or 'Really like' their school meals compared to 49% in schools with no FFL award.

Pupils in FFL schools were significantly more likely to give a positive rating of meals in their school (p = 0.000). The same association was found for pupils in FFL award schools (p = 0.016).

After adjusting for gender, FSME and local authority differences in the regression model, pupils in FFL schools were about 40% more likely to 'Like' or 'Really like' school meals (OR=1.43, p=0.00, CI=1.71-1.75).

Chart 3: Rating of School Meals. All pupils (No award school pupils n=1027, FFL award school pupils n=976, 'Don't know' respondents excluded)



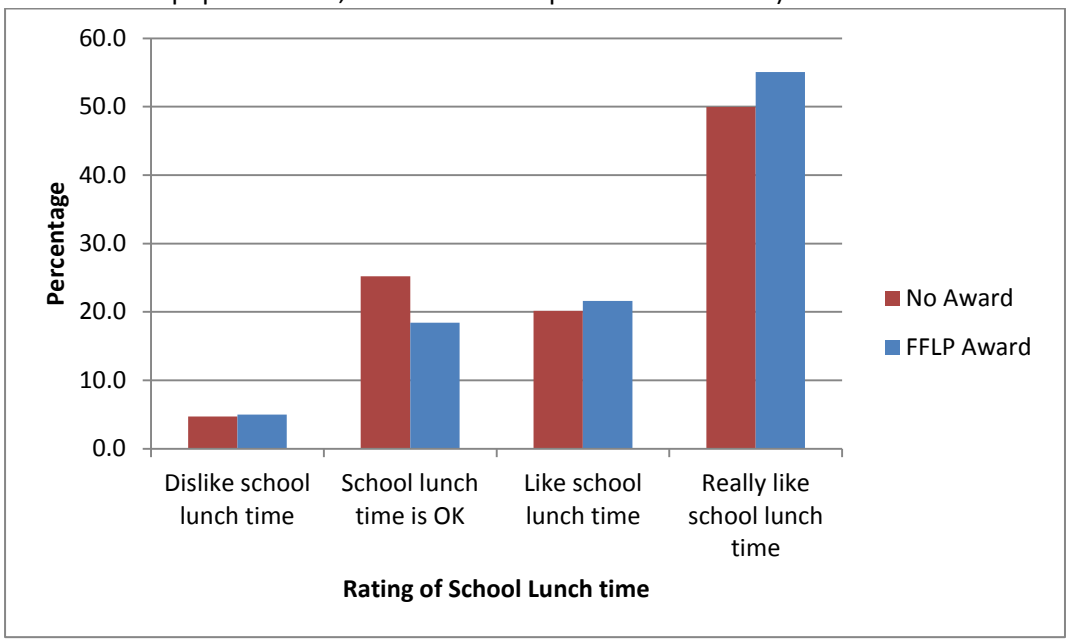
Rating school meals was also associated with fruit and vegetable intake (p=0.046).

Preliminary analysis found no clear differences between the views of pupils in bronze and silver FFL award schools with respect to school meals, and further analysis is not presented in this report.

4.4.2 Attitudes to the school lunch period

Chart 4 presents pupils' rating of their school lunch time period. Although there is a positive trend for pupils in FFL award schools the differences overall are not clearly evident in this chart.

Chart 4: Rating of the School Lunch Time. All pupils (No award school pupils n=1197, FFL award school pupils n=1115, 'Don't know' respondents excluded)



Pupils in FFL schools were significantly more likely to give a positive rating of school lunchtime in their school (p = 0.005).

4.4.3 Helping to cook

Pupils were asked two linked questions about cooking. Firstly whether they had helped a grown up to cook a meal in the last week and if so how many times. For the overall survey there was no evidence of a significant difference between the FFL and Comparison schools with regard to both measures (p=0.126 and p=0.188 respectively). There were also no significant differences for these measures between pupils in FFL award schools and schools with no award (p=0.923 and p=0.45 respectively). In this report, subsequent analysis provides different results at the level of local commission areas.

5. FINDINGS: FFL LOCAL COMMISSION A

5.1 Introduction

This sub-report sets out the findings of a survey of 8-10 year old pupils (Years 4 and 5) in primary schools in local commission A. It is part of a larger study of five FFL commissions with local authorities in England. Full details on the context and methodology are provided in the earlier sections of this report. The survey for local commission A took place in two waves in November 2014 and in April 2015.

5.2 Characteristics of the survey population

The following table sets out the characteristics of pupils in local commission A. These were sampled from 5 schools engaged with the FFL local programme and three that were not engaged with the programme at the point of the survey.

Table 8. Local Commission A: Characteristics of the Survey Population

	FFL Engaged School n=296 *Number (%) of participants*	Comparison School n=132 *Number (%) of participants*
Gender		
Boy	147 (49.7)	74 (56.1)
Girl	149 (50.3)	58(43.9)
Age		
8	109(36.8)	28 (21.2)
9	128 (43.2)	56 (42.4)
10	59 (19.9)	48 (36.4)
SES (FSME Quintile)		
Top quintile (41.6%+)	-	-
2nd quintile (25.5-41.5%)	64 (21.6)	-
3rd quintile (15.7-25.4%)46	127 (42.9)-	52 (39.4)
4th quintile (9.3-15.6%)109	-	80 (60.6)
Bottom quintile (0-9.2%)57	105(35.5)	-
Attending school with an FFL award?		
No	58 (19.6)	132 (100)
Bronze	238 (80.4)	-
Silver	-	-

5.3 Fruit and vegetable consumption

The following table summarises the differences between the two groups in terms of the means for fruit and vegetable consumption split by different types of measure. The results show a trend towards significance ($p<0.05$) for the total fruit and vegetables consumed across the course of the day.

Table 9. Outcome Summary for Local Commission A (FFL schools: n = 296, Comparison schools: n = 132)

	FFL Engagement	Mean DILQ portions	Std. Deviation	t test*
Fruit & vegetables in school	FFL	1.03	1.15	
	Comparison	.83	1.07	p=0.088
Fruit & vegetables out of school	FFL	.79	1.03	
	Comparison	.62	.89	p=0.103
Total vegetables	FFL	.79	.87	
	Comparison	.62	.74	p=0.047
Total fruit	FFL	1.03	1.60	
	Comparison	.83	1.47	p=0.219
Total fruit & vegetables	FFL	1.82	1.89	
	Comparison	1.45	1.69	p=0.052
Total fruit & vegetables plus Juice (max. 1 serving)	FFL	2.41	2.02	
	Comparison	2.05	1.78	p=0.085
Binary: 5 a Day (under 5 or 5 and over)	FFL	1.10	.30	
	Comparison	1.08	.28	p=0.560
Binary: National average 2.55 (under or 2.55 plus portions)	FFL	1.27	.44	
	Comparison	1.18	.39	P=0.047

*Independent sample t-test for difference in means

The percentage of pupils eating 5 or more portions of fruit and vegetables was higher in FFL schools but the difference was not significant (p = 0.560). Further analysis using logistic regression shows that, after adjusting for FSME and gender, pupils in FFL schools were not more likely to eat 5 portions or more a day than pupils in Comparison schools (OR=1.12; p=0.654; CI=0.57-2.45).

The percentage of pupils eating above the national average number of portions of fruit and vegetables was higher in FFL schools (p = 0.047). However after adjusting for FSME and gender, pupils in FFL schools were not more likely than those in comparison schools to eat more the national average number of 2.55 fruit and vegetable portions per day (OR=1.61; p=0.093; CI=0.93-2.62).

5.4 School meal take up in Local Commission A

Pupils were asked to record how many times, from 0 to 5, they had had a school meal in the last week. School meal take up was calculated by dividing the total number of meals recorded by the number of meal opportunities (n x 5 days). Using this calculation:

- School meal take up in FFL Schools was 65.3% (n=293, sum=956, mean=3.26, SD=2.15)
- School meal take up in Comparison Schools was 61.5% (n=131 sum=655, mean=3.08, SD=2.20)

The difference in school meal uptake calculated in this was is notable but not of significance (p=0.413)

A further approach to understand take up is to measure the percentage of pupils that had at least one school meal in the last week. Using this calculation:

- 78.4% of pupils in FFL schools had at least one school meal in the last week (n=293)
- 73.5% of pupils in Comparison schools had at least one school meal in the last week (n=131)

This is a difference of 4.9%. An independent means t-test found that this difference was not significant (p=0.91).

5.5 Other outcomes linked to engagement with FFL

5.5.1 Attitudes towards school meals and the school lunch time

Pupils in FFL schools were no more likely to 'like or really like' their school meals than those in Comparison schools (p=0.517). However it is worth noting that FFL pupil ratings of school meals were overall positive and somewhat more so than for the whole survey average.

Pupils in FFL schools were no more likely to 'like or really like' the lunch break overall than those in comparison schools (*p* = 0.695).

Table 10. Attitudes towards School Meals and the School Lunch times in Local Commission A

	FFL Engagement	No.	Mean	Std. Deviation	t test*
How much do you like school meals?	FFL School	289	3.13	1.61	
	Comparison	130	3.02	1.71	p=0.517
How much do you like lunch time at your school?	FFL School	291	4.00	1.21	
	Comparison	130	4.05	1.24	p=0.695

*Independent sample t-test for difference in means

5.5.2 Helping to cook

Table 11 shows that pupils in FFL schools were likely to cook more often than their counterparts in the last week but this difference was not significant.

Table 11: Helping to Cook in Local Commission A (FFL schools: n = 290, Comparison schools: n = 131)

	FFL Engagement	Mean	Std. Deviation	t test*
Last week did you help a grown up to cook a meal?	FFL School	.50	.50	
	Comparison	.40	.49	p=0.070
How many times did you help a grown up to cook in the last week?	FFL School	1.57	2.53	
	Comparison	1.55	2.68	p=0.933

*Independent sample t-test for difference in means

6. FINDINGS: FFL LOCAL COMMISSION B

6.1 Introduction

This sub-report sets out the findings of a survey of 8-10 year old pupils (Years 4 and 5) in primary schools in local commission B. It is part of a larger study of five FFL commissions with local authorities in England. Full details on the context and methodology are provided in the main report on this research. The survey for local commission B took place in November 2014 and March 2015.

6.2 Characteristics of the survey population

The following table sets out the characteristics of pupils in local commission B. Participating pupils were sampled from 5 schools engaged with the FFL local programme and 5 that were not engaged with the programme at the point of the survey.

The high percentage of pupils from FFL schools with higher FSME quintile reflects the targeted nature local commission B. Analysis showed that there was no significance difference between the two groups in terms of percentage FSME (FFL, mean=28.8; Comparison 27.5, p=0.298).

Table 12. Local Commission B: Characteristics of the Survey Population

	FFL Engaged School n=267 *Number (%) of participants*	Comparison School n=288 *Number (%) of participants*
Gender		
Boy	134 (50.2)	147 (51.0)
Girl	133 (49.8)	141 (49.0)
Age		
8	95 (35.6)	78 (27.1)
9	120 (44.9)	146 (50.7)
10	52 (19.5)	64 (22.2)
SES (FSME Quintile)		
Top quintile (41.6%+)	102 (38.2)	79 (27.4)
2nd quintile (25.5-41.5%)	-	79 (27.4)
3rd quintile (15.7-25.4%)46	165 (61.8)	38 (13.2)
4th quintile (9.3-15.6%)109	-	-
Bottom quintile (0-9.2%)57	-	92 (31.9)
Attending school with an FFL award?		
No	38 (14.2)	288 (100)
Bronze	229 (85.8)	-
Silver	-	-

6.3 Fruit and vegetable consumption

Table 9 summarises findings of the comparison in reported fruit and vegetable consumption between FFL and Comparison schools. There was no overall difference in fruit and vegetable consumption between the two groups (p=0.068). However reported fruit and vegetable consumption in school time was higher in FFL schools (p=0.042).

Table 13: Outcome Summary Table for Local Commission B (FFL schools: n = 267, Comparison schools: n = 288)

	FFL Engagement	Mean	Std. Deviation	t test*
Fruit and vegetables in school	FFL	1.39	1.31	
	Comparison	1.17	1.22	p=0.042
Fruit & vegetables out of school	FFL	0.87	1.03	
	Comparison	0.78	1.00	p=0.309
Total vegetables	FFL	0.79	0.95	
	Comparison	0.79	1.02	p=0.978
Total fruit	FFL	1.46	1.63	
	Comparison	1.16	1.64	p=0.033
Total fruit & vegetables	FFL	2.26	2.03	
	Comparison	1.95	1.97	p= 0.068
Total Fruit and Veg plus max of 1 serving of juice	FFL	2.84	2.15	
	Comparison	2.38	2.06	p=0.005
Binary: 5 a Day (under 5 or 5 and over)	FFL	1.13	0.34	
	Comparison	1.11	0.32	p=0.471
Binary: National average 2.55 (under or 2.55 plus portions)	FFL	1.42	.49	
	Comparison	1.31	.46	p=0.000

*Independent sample t-test for difference in means

The percentage of pupils eating five or more portions of fruit and vegetables was not higher in FFL schools (p = 0.471). Further analysis using logistic regression shows that, after controlling for FSME and gender, pupils in FFL schools are not more likely to eat 5 portions or more a day than pupils in Comparison schools (OR=1.21; p=0.470; CI=0.72-2.01).

However, the percentage of pupils eating above the national average number of portions of fruit and vegetables was higher in FFL schools (p = 0.000. Logistic regression controlling for gender and FSME found that pupils in FFL schools are one and half times more likely to eat more than the national average number of portions of fruit and vegetable a day than pupils in Comparison schools (OR=1.56; p=0.010; CI=1.11-2.20).

6.4 School meal take up in Local Commission B

Pupils were asked to record how many times, from 0 to 5, they had had a school meal in the last week. School meal take up was calculated by dividing the total number of meals recorded by the number of meal opportunities (n x 5 days). Using this calculation:

- School meal take up in FFL award schools was 49.2% (n=261, sum=641, mean=2.46, SD=2.165)
- School meal take up in Comparison schools was 56% (n=288, sum=806, mean=2.80, SD=2.092)

This is a difference of 6.8% lower in FFL award Schools. An independent means t-test found that this difference was not significant (p=0.060).

A further approach to understand take up is to measure the percentage of pupils that had at least one school meal in the last week. Using this calculation:

- 67.8% of pupils in FFL schools had at least one school meal in the last week (n=261).
- 76.4% of pupils in Comparison schools had at least one school meal in the last week (n=288).

This is a difference of 8.6% lower in FFL Schools. An independent means t-test found that this difference was significant (p=0.026).

6.5 Other outcomes linked to engagement with FFL

6.5.1 Attitudes towards school meals, the school lunch time and cooking activities

Table 21 shows that pupils in FFL Schools were more likely to 'like' or 'really their' school meals (p=0.005) and their school lunch period (p=0.040). There were no differences in terms of helping an adult to cook a meal.

Table 14 Attitudes towards School Meals, the School Lunch Time and Cooking Activities in Local Commission B

	FFL Engagement	n	Mean	Std. Deviation	t test*
How much do you like school meals?	FFL School	234	3.78	1.25	
	Comparison	247	3.46	1.28	p=0.005
How much do you like lunch time at your school?	FFL School	248	4.23	.97	
	Comparison	262	4.05	1.05	p=0.040
Last week did you help a grown up to cook a meal? (Q20a)	FFL School	257	.44	.50	
	Comparison	287	.43	.50	p=0.732
Number of times helping a grown to cook (capped at 8)	FFL School	257	1.38	2.13	
	Comparison	287	1.56	2.41	p=0.347

*Independent sample t-test for difference in means

7. FINDINGS: FFL LOCAL COMMISSION C

7.1 Introduction

This sub-report sets out the findings of a survey of 8-10 year old pupils (Years 4 and 5) in primary schools in local commission C. It is part of a larger study of five FFL commissions with local authorities in England. Full details on the context and methodology are provided in the earlier sections of this report. The survey for local commission C took place in two waves in November 2014 and in April 2015.

7.2 Characteristics of the survey population

The following table sets out the characteristics of pupils in local commission C. These were sampled from 5 schools engaged with the FFL local programme and 5 that were not engaged with the programme at the point of the survey.

A notable feature of the pupils in this survey was that there is a clear contrast in terms of the FFL award status of their respective schools: the 'engaged' group all had silver FFL Award status, whereas Comparison schools did not have a FFL award.

Table 15. Local Commission C: Characteristics of the Survey Population

	FFL Engaged School n=258 *Number (%) of participants*	Comparison School n=229 *Number (%) of participants*
Gender		
Boy	138 (53.5)	121 (52.8)
Girl	120 (46.5)	108 (47.2)
Age		
8	92 (35.7)	55 (24.0)
9	130 (50.7)	127 (55.5)
10	36 (14.0)	47 (20.5)
SES (FSME Quintile)		
Top quintile (41.6%+)	46 (17.8)	67 (29.3)
2nd quintile (25.5-41.5%)	46 (17.8)	43 (18.8)
3rd quintile (15.7-25.4%)46	-	34 (14.0)
4th quintile (9.3-15.6%)109	109 (42.2)	-
Bottom quintile (0-9.2%)57	57 (22.1)	85 (37.1)
Attending school with an FFL award?		
No	-	229
Bronze	-	-
Silver	258	-
School lunches		
0 school meal in last week	61 (23.6)	72 (31.4)
1 or more school meals in last week	196 (76.0)	152 (66.4)
Missing data	1 (0.4)	-

7.3 Fruit and vegetable consumption

The following table summarises the differences between the two groups in terms of the means for fruit and vegetable consumption split by different types of measure. The results show significance ($p<0.05$) for the key outcomes.

There are a number of options for interpreting these findings. For example, with regard to total fruit and vegetables consumed, pupils in FFL schools are recorded as consuming 56% more (2.20/1.41) than pupils in the Comparison schools.

Table 16. Outcome Summary Table for Local Commission C (FFL schools: n = 258, Comparison schools: n = 229)

	FFL Engagement	Mean	Std. Deviation	t test*
Fruit & vegetables in school	FFL	1.41	1.25	
	Comparison	.81	1.04	p=0.000
Fruit & vegetables out of school	FFL	.79	1.01	
	Comparison	.60	.78	p=0.016
Total vegetables	FFL	.93	.93	
	Comparison	.61	.76	p=0.000
Total fruit	FFL	1.26	1.78	
	Comparison	.80	1.32	p=0.001
Total fruit & vegetables	FFL	2.20	2.03	
	Comparison	1.41	1.58	p=0.000
Total fruit & vegetables plus Juice (max. 1 serving)	FFL	2.82	2.15	
	Comparison	2.01	1.70	p=0.000
Binary: 5 a Day (under 5 or 5 and over)	FFL	1.16	.37	
	Comparison	1.03	.18	p=0.000
Binary: National average 2.55 (under or 2.55 plus portions)	FFL	1.34	.48	
	Comparison	1.24	.43	p=0.000

*Independent sample t-test for difference in means

The percentage of pupils eating 5 or more portions of fruit and vegetables was higher in FFL schools (p = 0.000). Further analysis using logistic regression shows that, after adjusting for FSME and gender, pupils in FFL schools are 5 times more likely to eat 5 portions or more a day than pupils in Comparison schools (OR=5.11; p=0.000; CI=2.31-11.31).

The percentage of pupils eating above the national average number of portions of fruit and vegetables was higher in FFL schools (p = 0.000). However after adjusting for FSME and gender, pupils in FFL schools were not more likely than those in comparison schools to eat more the national average number of 2.55 fruit and vegetable portions per day (OR=1.34; p=0.15; CI=0.89-2.02).

7.4 School meal take up in Local Commission C

Pupils were asked to record how many times, from 0 to 5, they had had a school meal in the last week. School meal take up was calculated by dividing the total number of meals recorded by the number of meal opportunities (n x 5 days). Using this calculation:

- School meal take up in FFL schools was 71.0% (n=257, sum=914, mean=3.56, SD=2.177)
- School meal take up in Comparison schools was 55.6% (n=224, sum=623, mean=2.78, SD=2.310)

There is a large difference (15.4%) between groups. An independent means t-test found that this difference was significant (p=0.000).

A further approach to understand take up is to measure the percentage of pupils that had at least one school meal in the last week. Using this calculation:

- 76.0% of pupils in FFL schools had at least one school meal in the last week (n=258)
- 66.1% of pupils in Comparison schools had at least one school meal in the last week (n=229)

This is a difference of 9.9%. An independent means t-test found that this difference was significant (p=0.041).

7.5 Other outcomes linked to engagement with FFL

7.5.1 Attitudes towards school meals and the school lunch time

Pupils in FFL schools were no more likely to 'like or really like' their school meals than those in Comparison schools (p=0.642). However it is worth noting that FFL pupil ratings of school meals were overall positive and somewhat more so than for whole survey average.

Pupils in FFL schools were more likely to 'like or really like' the lunch break overall than those in Comparison schools (*p* = 0.001).

Table 17. Attitudes towards School Meals and the School Lunch Time in Local Commission C

	FFL Engagement	n	Mean	Std. Deviation	t test*
How much do you like school meals?	FFL school	217	3.68	1.19	
	Comparison	179	3.74	1.17	p=0.642
How much do you like lunch time at your school?	FFL school	244	4.16	.96	
	Comparison	207	3.90	1.04	p=0.001

*Independent sample t-test for difference in means

7.5.2 Helping to cook

Table 11 shows that pupils in FFL schools were likely to cook more often than their counterparts in the last week (Means: FFL, 1.54; Comparison, 1.13, p=0.044).

Table 18: Helping to Cook in Local Commission C

	FFL Engagement	n	Mean	Std. Deviation	t test*
Last week did you help a grown up to cook a meal? (Q20a)	FFL school	257	.47	.50	
	Comparison	219	.39	.49	p=0.058
How many times did you help a grown up to cook in the last week?	FFL school	257	1.54	2.51	
	Comparison	219	1.13	1.91	p=0.044

*Independent sample t-test for difference in means

7.5.3. Additional dietary analysis

The analysis found no difference in the consumption of sweet snacks and savoury (salty) snacks in school or out of school. Pupils in comparison schools consumed significantly more servings of high energy drinks out of school compared to pupils in FFL schools (p=0.002) while differences in consumption of high fat food only just reached significance (p=0.045) for pupils in FFL schools.

Table 19. Additional Dietary Analysis in Local Commission C (FFL: n = 258, Comparison: n = 229)

	FFL Engagement	Mean number servings	Std. Deviation	t test*
Sweet snacks in school	FFL	0.53	.62	
	Comparison	0.58	.58	p=0.324
Sweet snacks out of school	FFL	0.69	.86	
	Comparison	0.69	.84	p=1.000
Savoury (salty) snacks in school	FFL	0.16	.38	
	Comparison	0.19	.41	p=0.365
Savoury (salty) snacks out of school	FFL	0.15	.38	
	Comparison	0.10	.31	p=0.083
Sweet and savoury (salt) snacks at school	FFL	0.68	0.76	
	Comparison	0.77	0.68	p=.190
Sweet and savoury (salt) snacks out of school	FFL	1.13	.90	
	Comparison	1.11	.81	P=.859
All sweet and savoury (salt) snacks	FFL	1.52	1.29	
	Comparison	1.55	1.26	p=.787
High fat food in school	FFL	0.46	.60	
	Comparison	0.35	.54	p=0.045
High fat food out of school	FFL	0.57	.76	
	Comparison	0.62	.74	p=0.456
High energy drinks in school	FFL	0.17	.39	
	Comparison	0.24	.46	p=0.092
High energy drinks out of school	FFL	0.76	.88	
	Comparison	1.03	1.02	p=0.002

*Independent sample t-test for difference in means

8. FINDINGS: FFL LOCAL COMMISSION D

8.1 Introduction

This sub-report sets out the findings of a survey of 8-10 year old pupils (Years 4 and 5) in primary schools in local commission D. It is part of a larger study of five FFL commissions with local authorities in England. Full details on the context and methodology are provided in the main report on this research. The survey took place in November 2014.

8.2 Characteristics of the survey population

The following table sets out the characteristics of pupils in local commission D. These were sampled from 5 schools engaged with the FFL local programme and 5 that were not engaged with the programme at the point of the survey.

Table 20. Local Commission D: Characteristics of the Survey Population

	FFL Engaged School n=215 *Number (%) of participants*	Comparison School n=229 *Number (%) of participants*
Gender		
Boy	112 (52.1)	114 (49.6)
Girl	103 (47.9)	116 (50.4)
Age		
8	75 (34.9)	111 (48.0)
9	112 (52.1)	102 (44.3)
10	28 (13.0)	17 (7.4)
SES (FSME Quintile)		
Top quintile (41.6%+)	107 (49.8)	37 (16.1)
2nd quintile (25.5-41.5%)	-	53 (23.0)
3rd quintile (15.7-25.4%)46	43 (20.0)	-
4th quintile (9.3-15.6%)109	65 (30.2)	107 (46.5)
Bottom quintile (0-9.2%)57	-	33 (14.3)
Attending school with an FFL award?		
No	50	230
Bronze	100	-
Silver	65	-

In contrast to some of the local commissions, the survey sampling approach led to the selection of one school that was a target for the FFL Commission but, at the time of survey, had not achieved an FFL bronze award.

8.3 Fruit and vegetable consumption

A first line of analysis compared two groups: FFL Engaged (or Targeted) Schools with Comparison (non-targeted schools). This analysis found that, overall there were few significant differences between the two groups for the main outcome measures. These findings are not reported in this report.

Building upon the findings regarding FFL award schools in (see section 4.2.4) a further line of analysis compared pupil in schools that had an FFL award with those that did not. Table 10 shows that comparison by FFL award status shows significant differences for the main outcome measure and sub-measures in local commission D.

Table 21. Outcome Summary Table for Local Commission D (FFL schools: n = 280, FFL award (bronze or silver: n = 165)

	FFL award Status	Mean	Std. Deviation	t-test
Fruit & vegetables in school	No award	.73	1.00	
	FFL award (bronze or silver)	1.15	1.12	p=0.000
Fruit & vegetables out of school	No award	.55	.82	
	FFL award (bronze or silver)	.75	.99	p=0.025
Total vegetables	No Award	.44	.78	
	FFL award (bronze or silver)	.78	.99	p=0.000
Total fruit	No award	.84	1.28	
	FFL award (bronze or silver)	1.11	1.42	p=0.042
Total fruit and vegetables	No award	1.26	1.51	
	FFL award (bronze or silver)	1.89	1.78	p=0.000
Total Fruit and Veg plus max of 1 serving of juice	No award	1.83	1.64	
	FFL award (bronze or silver)	2.45	1.96	p=0.001
Binary: 5 a Day (under 5 or 5 and over)	No award	1.04	.19	
	FFL award (bronze or silver)	1.10	.31	p=0.011
Binary: National average 2.55 (under or 2.55 plus portions)	No award	1.22	.42	
	FFL award (bronze or silver)	1.21	.41	p=0.457

*Independent sample t-test for difference in means

Further analysis using logistic regression shows that, after controlling for FSME and gender, pupils in FFL award schools are twice as likely to eat 5 portions or more a day than pupils in Comparison schools (OR=2.32; p=0.045; CI=1.02-5.28)

Pupils in FFL schools were not more likely than those in comparison schools to eat more the national average number of fruit and vegetable portions per day (OR=1.02; p=0.92; CI=0.68-1.55).

8.4 School meal take up in Local Commission D

Pupils were asked to record how many times, from 0 to 5, they had had a school meal in the last week. School meal take up was calculated by dividing the total number of meals recorded by the number of meal opportunities (n x 5 days). Using this calculation:

- School meal take up in FFL schools was 37.6% (n=215, sum=405, mean=1.88, SD=2.140)
- School meal take up in Comparison schools was 31.6% (n=227, sum=358, mean=1.58, SD=2.200)

Although there was a positive difference for FFL schools, an independent means t-test found that this difference was not significant (p=0.138).

A further approach to understand take up is to measure the percentage of pupils that had at least one school meal in the last week. Using this calculation:

- 51.6% of pupils in FFL Schools had at least one school meal in the last week (n=215)
- 37.4% of pupils in Comparison Schools had at least one school meal in the last week (n=227)

This is a difference of 14.2%. An independent means t-test found that this difference was significant (p=0.003). This shows that while school meal take up is low for both groups, pupils in FFL Schools are more likely than those in Comparison schools to have school meals on some occasions.

8.5 Other outcomes linked to engagement with FFL

8.5.1 Attitudes towards school meals, the school lunch time and cooking activities

Table 18 shows that there were no significant differences between the groups in terms of attitudes towards school meals, the school lunch time and experiences of helping an adult to cook food.

Table 22: Attitudes towards School Meals, School Lunch Times and Cooking Activities in Local Commission D

	FFL Award Status	n	Mean	Std. Deviation	t-test*
How much do you like school meals?	No award	200	3.06	1.56	
	FFL award (bronze / silver)	145	3.18	1.43	p=0.468
How much do you like lunch time at your school?	No award	263	4.23	1.04	
	FFL award (bronze / silver)	157	4.24	1.27	p=0.903
Last week did you help a grown up to cook a meal? (Binary: yes, no)	No award	278	.47	.50	
	FFL award (bronze / silver)	165	.46	.50	p=0.773
Number of times helping an adult to cook	No award	278	1.52	2.31	
	FFL award (bronze / silver)	165	1.19	1.87	p=0.101

*Independent sample t-test for difference in means

9. FINDINGS: FFL LOCAL COMMISSION E

9.1 Introduction

This sub-report sets out the findings of a survey of 8-10 year old pupils (Years 4 and 5) in primary schools in local commission E. It is part of a larger study of five FFL commissions with local authorities in England. Full details on the context and methodology are provided in the main report on this research. The survey for local commission E took place between April and July 2015.

9.2 Characteristics of the survey population

The following table sets out the characteristics of pupils in local commission E. These were sampled from 4 schools engaged with the FFL local programme and 5 that were not engaged with the programme at the point of the survey.

Table 23. Local Commission E: Survey Population Characteristics

	FFL Engaged School n=229 *Number (%) of participants*	Comparison School n=267 *Number (%) of participants*
Gender		
Boy	113 (49.3)	140 (52.4)
Girl	116 (50.7)	127 (47.6)
Age		
8	48 (21.0)	71 (26.6)
9	96 (41.9)	144 (53.9)
10	85 (37.1)	52 (19.5)
SES (FSME Quintile)		
Top quintile (41.6%+)	-	-
2nd quintile (25.5-41.5%)	-	-
3rd quintile (15.7-25.4%)	50 (21.8)	97 (36.3)
4th quintile (9.3-15.6%)	65 (28.4)	58 (21.7)
Bottom quintile (0-9.2%)	114 (49.8)	112 (41.9)
Attending school with an FFL award?		
No	-	267
Bronze	65	-
Silver	164	-

9.3 Fruit and vegetable consumption

Table 24: Outcome Summary Table for Local Commission E (FFL schools: n = 229, Comparison schools: n = 267)

	FFL Engagement	Mean	Std. Deviation	t test*
Fruit & vegetables in school	FFL	1.43	1.21	
	Comparison	.75	.93	p=0.000
Fruit & vegetables out of school	FFL	.82	.97	
	Comparison	.63	.80	p=0.016
Total vegetables	FFL	.86	.81	
	Comparison	.61	.80	p=0.001
Total fruit	FFL	1.39	1.57	
	Comparison	.78	1.22	p=0.000
Total fruit & vegetables	FFL	2.25	1.86	
	Comparison	1.38	1.45	p=0.000
Total fruit & vegetables plus Juice (max. 1 serving)	FFL	2.90	1.87	
	Comparison	1.90	1.58	p=0.000
Binary: 5 a Day (under 5 or 5 and over)	FFL	1.14	.35	
	Comparison	1.04	.208	p=0.000
Binary: National average 2.55 (under or 2.55 plus portions)	FFL	1.37	.48	
	Comparison	1.19	.39	p=0.000

*Independent sample t-test for difference in means

The percentage of pupils eating five or more portions of fruit and vegetables was higher in FFL schools, p = 0.000. Further analysis using logistic regression shows that, after controlling for FSME and gender, pupils in FFL schools are 3 times more likely to eat 5 portions or more a day than pupils in Comparison schools (OR=3.04; p=0.002; CI=1.51-6.11).

The percentage of pupils eating above the national average number of portions of fruit and vegetables was higher in FFL schools, p = 0.000. After controlling form FSME and gender, pupils in FFL schools are also two times more likely to eat more than the average number of portions of fruit and vegetable a day than pupils in Comparison schools (OR=2.22; p=0.000; CI=1.46-3.36).

9.4 School meal take up in Local Commission E

Pupils were asked to record how many times, from 0 to 5, they had had a school meal in the last week. School meal take up was calculated by dividing the total number of meals recorded by the number of meal opportunities (n x 5 days). Using this calculation:

- School meal take up in FFL Schools was 52.0% (n=229, sum=606, mean=2.65, SD=2.16)
- School meal take up in Comparison Schools was 48% (n=267, sum=644, mean=2.41, SD=2.19)

This is a difference of 4.0%. An independent means t-test found that this difference was not significant (p=0.232).

A further approach to understand take up is to measure the percentage of pupils that had at least one school meal in the last week. Using this calculation:

- 71.2% of pupils in FFL Schools had at least one school meal in the last week (n=229)
- 64.4% of pupils in Comparison Schools had at least one school meal in the last week (n=267)

This is a difference of 6.7%. An independent means t-test found that this difference was not significant (p=0.805).

9.5 Other outcomes linked to engagement with FFL

9.5.1 Attitudes towards school meals and the school lunch time

With regard to pupils who have school meals, pupils in FFL schools were not more likely to 'like or really like' their schools meals compared to those in Comparison schools.

There was no difference between the pupil groups with regard to their views about the lunch break overall, p=0.082.

Table 25: Attitudes towards School Meals and School Lunch Times in Local Commission E (FFL schools: n = 228, Comparison schools: n = 266)

	FFL Engagement	Mean	Std. Deviation	
How much do you like school meals?	FFL School	3.26	1.51	
	Comparison	3.00	1.80	p= 0.263
How much do you like lunch time at your school?	FFL School	4.26	1.10	
	Comparison	4.18	1.23	p=0.082

9.5.2 Helping to cook

Table 15 shows that pupils in Comparison Schools were more likely to have helped an adult cook in the last week.

Table 26: Helping to Cook in Local Commission E

	FFL Engagement	n	Mean	Std. Deviation	t test*
Last week did you help a grown up to cook a meal?	FFL School	229	.47	.50	
	Comparison	267	.48	.50	p=0.863
How many times did you help a grown up to cook in the last week?	FFL School	229	1.31	1.95	
	Comparison	266	1.77	2.89	p=0.040

*Independent sample t-test for difference in means

10. DISCUSSION

10.1 Fruit and vegetable consumption, and the FFL locally commissioned programme

This study found that the mean for daily fruit and vegetable consumption was significantly higher for Year 4 and 5 pupils (aged 8-10) in FFL schools compared to those in schools not engaged with the programme. Whilst bearing in mind the limitations of the DILQ methodology for portion counting, this was equivalent to approximately 0.5 portion or 40 grams difference between the groups. This finding is consistent with a recent meta-analysis of school-based interventions that, found an improvement of 0.25 portions of fruit and vegetables if fruit juice was excluded and 0.32 portions if fruit juice was included (Evans, et al, 2012).

For all pupils mean daily fruit and vegetable consumption was well below the public health 5-a-day guidelines, although this is consistent with evidence from other research studies with this age group in Europe, North America and Australia. The study found that a high proportion (28.4%) of participants reported eating no fruit or vegetables at all during the 24 hours prior to the survey. This proportion was lower in FFL schools (23.4%) than in Comparison schools (33.9%).

The wide gap between guidance and practice underscores the importance of improving dietary behaviours of children. It highlights the importance of school-based programmes given that, for many children, there are limited or no opportunities to eat fruit and vegetables at home. In this context evidence of a difference in diet is notable given that fruit and vegetable consumption in FFL schools was not only higher within school time, it was also higher at home. This finding is consistent with the FFL programme aspiration to have an impact that spills over from the school to the home, and suggests an extension of the programme's impact into the wider community. The large number of schools engaged in FFL local commissions further indicates the population reach of the programme. The design of the programme does not require high external inputs, for example in terms of external staffing, and therefore has the potential to deliver a good ratio of costs to benefits.

As a whole setting-based model, the FFL programme has a range of processes and mechanisms that may contribute towards a positive impact on dietary behaviour. These include the combined role of educational and school food activities, staff training and stakeholder participation as set out in FFL's logic model. The FFL award framework, from bronze to silver to gold, promotes incremental changes across a wide range of food related activities. Although the potential of this model is widely recognised in the literature on healthy school settings, evidence on the effects of specific programme mechanisms is less clear (Van Cauwenberghe et al 2010). The clearest evidence of an association between mechanisms and outcomes was with respect to the award status of schools: the study found that pupils in FFL silver award schools ate more fruit and vegetables than those in FFL bronze schools. This further supports the Phase 1 FFLP evaluation conclusions that the FFLP schools award levels can act as a "proxy for outcomes" linked to public health (Orme et al, 2011:15).

School meal take up was 4.2 percentage points higher in FFL schools than the Comparison schools. Pupils in FFL schools who had school meals were more likely to eat 5 a Day - and over the national average of portions of fruit and vegetables. However this association between school meal take up and fruit and vegetable intake was not found in Comparison schools. This suggests that school meals in FFL schools are an important driver for improving diet, but that this is not necessarily the case for schools that do not have FFL award status. FFL standards, as expressed in both the FFL award and FFL Catering Mark include criteria for promoting salad, vegetables and

fresh fruit at mealtimes. These criteria go beyond national school food and dietary guidelines and may contribute towards the enhanced dietary impact of school meals in FFL award schools compared to schools without an award.

Other potential processes for promoting fruit and vegetable consumption may be linked to perceptions of school meals, the school lunch time and cooking activities. There were positive associations between FFL status and these measures; however the links here need some further analysis (warrant further investigation) given that they are not straightforward.

Although there was evidence of a difference in the diets of pupils in FFL and Comparison schools overall, at the level of the local authority these outcomes were not consistently evident. There are a wide variety of reasons why this study may have not found evidence of positive outcomes at the local authority level. These include limitations of interpreting the survey data at the local level given the sample characteristics; different types of local commission programme designs; and specific characteristics of the schools targeted in the local commissions. Although it was beyond the resources of the study to make a formal assessment, three factors appear to be important. Firstly there are infrastructure-based factors, such the absence of on-site facilities for freshly preparing school meals that impede the implementation of the FFL programme. Secondly wider social factors, such as social deprivation, create additional challenges for engagement and are particularly relevant in commissions where schools in such contexts are targeted for the programme. Thirdly, the level of resources available to the programme, including the duration and support from partner agencies, will impact on the scale and intensity of the impact.

It should also be noted that improvement in fruit and vegetable consumption is only one of the outcomes sought by the FFL programme. The FFL framework addresses four areas concerned with food procurement, healthy and sustainable food behaviours, food culture, and food systems change. This whole school approach therefore aims to deliver a range of outcomes, for example, including greater student and parental participation in decision-making on food-related issues in schools, or increasing ingredient spend in the local economy. It should be recognised that FFL local commission schools may have been prioritising these or other areas for change. This is consistent with research that suggests complex community programmes can achieve a wide range of outcomes aside from those that are the focus of an evaluation.

10.2 Study strengths and limitations

Some strengths of the study include the large pupil sample size, the measures taken to control for confounders and self-selection in the school recruitment process and the use of a well-recognised validated tool for dietary assessment with this age group.

There are a number of limitations to this study that need to be recognised. There was possible residual confounding by socio-economic factors. For each local authority area we were not able to able to achieve complete matches in terms the categories for FSME and student roll size. Nevertheless FSME at school level was adjusted for in our analyses. The sampling approach may also have been affected by a selection bias: schools that agreed to participate were perhaps more highly engaged in healthy food related activities. However it is not clear how this would have systemically affected two groups in different ways.

There is some evidence that the level of fruit and vegetable intake changes across seasons in younger age groups. Seasonality may have had an effect on the study given that surveys for two local authority areas had to be conducted at two time points in the school year.

Whilst it is a validated tool, the DILQ does not measure fruit and vegetables within composite foods, such as pizzas and pies. The explanation given is that interventions that encourage an increase in fruit and vegetable consumption do not usually include composite foods (Edmunds and Ziebland, 2002) and it would be too difficult to estimate their contribution to the diet (Roberts and Flaherty, 2010). In the Health Survey for England (HSE, 2014) fruit and vegetables were included only if they were a main constituent of the food such as stewed fruit and vegetable curry

Composite foods could be potentially significant in the context of the FFL programme given that the initiative includes a focus on including fruit and vegetables as part of composite dishes in school meals. We were not able to directly assess the contribution of these dishes towards student diets. Further research is needed to assess the feasibility of using an adapted version of the DILQ tool for the assessment of composite dishes, or to validate an alternate tool appropriate to the FFL programme context and/or have access to the recipes used in school meals.

Recent use of the DILQ tool to measure sweet and savoury snacks, high fat food and high energy drinks (Kipping et al, 2014) suggests that there is scope to use the DILQ to make further assessments of dietary behaviour beyond those of fruit and vegetable consumption. Kipping et al.'s methodology for dietary analysis is an option available where commissioners want to examine the impact of FFL on snacking behaviour in and out of school.

11. CONCLUSIONS

This is the first study of the FFL locally commissioned programme to evaluate dietary behaviour using a school matched case-comparison cross sectional study. Whilst limitations of the study design and its implementation need to be recognised, the study found evidence of a positive impact of a complex school settings-based programme. Given the challenges of promoting nutritional and food change at a population level, FFL can form one part of a wider coordinated approach that works across different settings, target groups and stakeholders. For schools participating in the programme, progression from bronze towards silver FFL award status and improvements to - or retention of - school meal take up appear to be important processes in improving dietary outcomes. Positive outcomes for the programme were more consistent in some local authority areas than others in this study than others. This highlights the need to build upon formal learning of what works in each area and to enhance programme elements that are likely to have greatest impact. To support the objectives of local authority commissioners, funders and service developers this will involve careful monitoring, refinement and tailoring of the programme to local delivery circumstances.

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Appendix 1: Selection and Recruitment of Schools

Stage 1: Initial Selection

Schools from two lists are matched by FSME and pupil roll category

FFL School List	
1	Selected
2	
3	
4	Selected
5	
6	
7	Selected
8	
9	
10	Selected
11	
12	
13	Selected
14	
15	

Comparison School List 1	
1	Selected
2	
3	
4	Selected
5	
6	
7	Selected
8	
9	
10	Selected
11	
12	
13	Selected
14	
15	

Comparison School List 2	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Stage 2: Initial Recruitment

Where selected FFL schools decline the next FFL school is list selected.

Where selected comparison schools decline, a matched school from list 2 is selected.

FFL School List	
1	Consented
2	
3	
4	Consented
5	
6	
7	Declined
8	Selected
9	
10	Consented
11	
12	
13	Declined
14	Selected
15	

Comparison School List 1	
1	Consented
2	
3	
4	Declined
5	
6	
7	
8	Selected
9	
10	Consent
11	
12	
13	
14	Selected
15	

Comparison School List 2	
1	
2	
3	
4	Selected
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Stage 3: Final Recruitment

Most schools are matched from FFL and Comparison lists.

In this example Comparison List 1, School 15 is recruited after first two matched schools decline.

FFL School List	
1	Consented
2	
3	
4	Consented
5	
6	
7	Declined
8	Consented
9	
10	Consented
11	
12	
13	Declined
14	Consented
15	

Comparison School List 1	
1	Consented
2	
3	
4	Declined
5	
6	
7	
8	Consented
9	
10	Consented
11	
12	
13	
14	Declined
15	Consented

Comparison School List 2	
1	
2	
3	
4	Consented
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	Declined
15	

Appendix 2: DILQ Survey Tool with additional FFL linked Questions

What did you do yesterday?

Girl ○ Boy ○ Age _____

Yesterday morning

My breakfast
draw your breakfast here

1. Did you have something to eat and drink for breakfast? What did you have?

_____

_____

_____

_____

drink: _____

2. Did you watch TV yesterday morning?

Yes ○ No ○

3. Did you have any thing to eat or drink on the way to school? What did you have?

_____

_____

drink: _____

4. How did you travel to school in the morning?

walk ○ cycle ○ scoot ○ bus ○ car ○

Make a tick in the circle next to your answer.

Yesterday at school

5. Did you have any thing to eat or drink at break time? What did you have?

_____

_____

drink: _____

6. What did you do at morning break yesterday?

sit around ○ stand around ○

walk around ○ run around ○

7. Did you have something to eat and drink for lunch yesterday? What did you have?

_____

_____

_____

_____

drink: _____

My lunch
draw your lunch here

8. What did you do at lunch time yesterday?

sit around ○ stand around ○ walk around ○ run around ○

Yesterday after school

9. How did you travel from school in the afternoon?

walk ○ cycle ○ scoot ○ bus ○ car ○

10. Did you eat or drink any thing whilst you were travelling home? What did you have?

11. After school yesterday what did you do?

play sport ○ after school club ○ another activity or club ○ went home ○

12. Did you eat or drink any thing else before your evening meal? What did you have?

Yesterday evening

13. Did you have an evening meal yesterday? What did you have?

My evening meal
draw your evening meal here

drink:

14. Did you watch TV yesterday evening?

Yes ○ No ○

15. Did you do any thing else before you went to bed? What did you do?

16. Did you have any thing else to eat or drink before you went to bed? What did you have?

The final questions are about school meals and cooking.

17. How many times did you have a school lunch last week?

0 days a week ○ 1 day a week ○ 2 days a week ○ 3 days a week ○ 4 days a week ○ 5 days a week ○

18. How much do you like school meals?

don't know ○ hate them ○ don't like them ○ they are OK ○ quite like them ○ really like them ○

19. How much do you like lunch time at your school?

don't know ○ hate it ○ don't like it ○ OK ○ quite like it ○ really like it ○

20. Last week did you help a grown up to cook a meal?

Yes ○ No ○ How many times? ☐

Appendix 3: Participating schools: the total number of pupils on roll for schools and proportion eligible for free school meals

The following tables show there was no significant difference in the overall size and FSME% between FFL and Comparison schools or between local authority areas. (n=2411)

	No. pupils on roll			**Free School Meal Eligibility FSME%**		
	Mean no.	**Min/Max (Range)**	**Standard Deviation**	**Mean FSME%**	**Min/Max (Range)**	**Standard Deviation**
By status						
FFL(n=24)	276	37-618 (581)	131.9	18.9	2.7-46.7 (44.0)	13.6
Comparison (n=23)	236	110-390 (280)	83.2	17.2	2.7-42.2 (39.5)	13.0
By Local Commission						
A (n=8)	275	108-502 (394)	133.1	13.5	3.1-19.9 (16.8)	6.7
B (n=10)	287	110-618 (508)	152.2	24.2	2.7-45.6 (42.9)	14.1
C (n=10)	275	174-390 (216)	85.4	23.6	7.1-46.7 (39.6)	16.2
E (n=9)	253	136-361 (225)	73.0	11.6	2.7-23.5 (20.8)	7.1
D (n=10)	195 256	37-323 (286)	92.3	15.9	2.7-42.2 (39.5)	14.4
Total		37-618 (581)	111.3	18.1	2.7-46.7 (44.0)	13.2

Mean number of pupils on roll: There was no significant difference in the mean number of pupils on roll in FFL schools compared to comparison schools (p=0.232) **or** between the mean number of pupils on roll in each Local Authority area (p=0.380)

Free School Meal Eligibility (FSME%): There was no significant difference in the FSME% for FFL schools compared to comparison schools (p=0.654) or between the FSME% in each Local Authority areas (p=0.113)

Local Commission A (n=8)

FFL Schools				Comparison schools			
School ID	No. pupils on roll	FSME%	No. q'aires completed	School ID	No. pupils	FSME%	No. q'aires completed
2C	108	4.6	49	1C	198	17.7	55
4C	420	3.1	56	3C	155	9.7	25
5C	242	16.7	58	8C	257	18.8	52
6C	502	17.7	64				
7C	318	19.9	69				
Mean	**318.0**	**12.4**	**59.2**		**203.3**	**15.4**	**44.0**
Std Devn.	**153.41**	**7.91**	**7.66**		**51.21**	**4.97**	**16.52**

Local Commission B (n=10)

FFL Schools				Comparison schools			
School ID	No. pupils on roll	FSME%	No. q'aires completed	School ID	No. pupils	FSME%	No. q'aires completed
1D	328	15.5	44	3D	351	35.2	79
2D	618	18.3	51	6D	352	8.5	52
4D	235	45.6	64	7D	110	2.7	40
5D	124	40.6	38	8D	124	19.9	38
10D	315	22.6	7	9D	316	33.1	79
Mean	**324.0**	**28.5**	**53.4**		**250.6**	**19.9**	**57.6**
Std devn.	**183.34**	**13.67**	**13.41**		**122.92**	**14.44**	**20.26**

Local Commission C (n=10)

FFLSchools				Comparison schools			
School ID	No. pupils on roll	FSME%	No. q'aires completed	School ID	No. pupils	FSME%	No. q'aires completed
3K	184	7.1	57	1K	285	24.4	34
4K	211	13.3	59	2K	390	42.0	67
5K	375	9.3	50	7K	212	37.5	43
6K	328	39.2	46	9K	217	8.8	56
8K	373	46.7	46	10K	174	8.0	29
Mean	**294.2**	**23.1**	**51.6**		**256.6**	**24.1**	**45.8**
Std Devn.	**90.76**	**18.43**	**6.111**		**85.11**	**15.76**	**15.68**

Local Commission D (n=10)

FFL Schools				Comparison schools			
School ID	No. pupils on roll	FSME%	No. q'aires completed	School ID	No. pupils	FSME%	No. q'aires completed
1L	268	29.9	57	5L	209	4.8	53
2L	286	4.7	51	6L	189	4.8	57
3L	37	8.1	14	9L	184	42.2	37
11L	90	17.8	43	10L	255	9.6	50
12L	323	33.9	50	13L	113	2.7	33
Mean	**200.8**	**18.9**	**43.0**		**190.0**	**12.8**	**46.0**
Std Devn.	**128.27**	**12.82**	**16.96**		**51.36**	**16.62**	**10.44**

Local Commission E (n=9)

FFL Schools				Comparison schools			
School ID	No. pupils on roll	FSME%	No. q'aires completed	School ID	No. pupils	FSME%	No. q'aires completed
1W	293	8.2	48	4W	348	11.5	58
2W	225	2.7	67	5W	201	18.9	44
3W	275	19.1	50	6W	230	7.4	54
8W	136	9.6	65	7W	361	23.5	53
				9W	207	3.4	58
Mean	**232.3**	**9.9**	**57.25**		**269.4**	**12.9**	**53.4**
Std Devn.	**70.3**	**6.82**	**10.21**		**78.57**	**8.21**	**5.73**