

## School lunch and learning behaviour in secondary schools: an intervention study

### Key Findings

Secondary school pupils were more on-task (concentrating and engaged) and less off-task (disengaged) in the classroom after lunch following a lunchtime intervention to improve the dining environment and the nutritional quality of the food.

- Eleven mixed secondary schools in four Local Authority areas in England took part in a 15-week intervention study to assess the impact on learning-related behaviours in the classroom, after lunch, following improvements at lunchtime to the dining environment and to the nutritional quality of the food served. There were seven intervention schools and four similar control schools in which no intervention took place.
  - Food interventions included: introducing new menus compliant with the food-based standards; holding healthy eating workshops, taster sessions and themed weeks; introducing vegetable and fruit packs; providing better marketing materials (e.g. menus with pictures); and introducing halal foods where appropriate. Changes to the dining environment included: changing the layout and queuing system; redecorating the dining room, including artwork and murals; introducing pupil supervisors; and buying new furniture.
  - Independent trained observers recorded pupil behaviour, in the classroom in the teaching sessions immediately after lunch, at the beginning of the study and again after a 15 week intervention. 'On task' behaviours that reflect concentration and engagement, and 'off task' behaviours that reflect disengagement were recorded in three social modes: pupil-teacher interaction; pupil-pupil interaction; and working alone.
  - It was found that following the intervention pupils were 18% more likely to be on task compared with those pupils in the control schools. Pupils in the intervention schools were also 14% *less* likely to be off-task than those in the control schools.
  - This study provides objective evidence that an intervention in secondary schools to improve school food and the dining environment has a positive impact on pupils' engagement and concentration and their ability to learn in the classroom after lunch. It also suggests that pupils are less likely to be disengaged. Further studies are needed to see if these behaviours translate into improved academic performance.
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## Background

The role of school food in promoting children's nutrition, growth and development, and health, is clear.<sup>1</sup> The re-introduction of standards for school food, and significant Government investment, into this policy area in recent years, has, therefore, been warranted.<sup>2 3 4</sup>

In 2007, the School Food Trust recruited six primary schools in Sheffield for a randomised control trial to see if the introduction of healthier school meals and improvements to the dining environment had a positive impact on learning-related behaviour of pupils in the classroom in the teaching session immediately after lunch.<sup>5</sup> After 12 weeks, pupil alertness increased. In fact, when pupils were interacting with their teachers, it was found that they were 3.4 times more likely to be 'on-task' (i.e. concentrating and engaged) in the intervention schools than in the control schools. The Trust decided to see if there would be a similar positive impact for pupils in secondary schools.

## Aims

The aim of the study was to determine whether, in secondary schools in England, the introduction and promotion of healthier school food and improvements to the dining room environment had a positive impact on learning behaviours in the classroom, immediately after lunch.

## Methods

**Study design:** The study was a controlled intervention trial involving year 7 and 9 pupils, aged 11-14 in eleven secondary schools. Schools were screened to make sure that they were suitable for inclusion and had the need and capacity to improve both food provision and dining environment. The schools chosen represented a cross-section of school types and socio-economic levels. Three mixed secondary schools were identified in each of four Local Authority areas in England: Manchester, Sheffield, Leicester and Essex. Two intervention schools and one similar control school were identified in each area (one area had only two schools as an intervention school was withdrawn due to difficulties in recruiting pupils). Food interventions included: changing menus to make them compliant with the food-based standards; holding healthy eating workshops, taster sessions and themed weeks; introducing vegetable and fruit packs; providing better marketing materials (e.g. menus with pictures); and introducing halal foods where appropriate. Changes to the dining environment included: changing the layout and queuing system; redecorating the dining room, including artwork and murals; and buying new furniture. Trained independent observers used systematic observation techniques<sup>a</sup> to record pupils' behaviour at baseline and at the end of 15 weeks. On-task and off-task behaviours<sup>b</sup> were observed and used as proxy measures for engagement and concentration, and disengagement, respectively. Behaviours were observed in three social modes: individual (pupils working alone); pupil-pupil (pupils working with each other); and teacher-pupil (pupils engaged with the teacher). A total of 168 pupils across 11 schools were recruited into the study, of whom 154 had their behaviours observed at baseline and 156 at follow up. The observers were not aware of the school's status (control or intervention).

## Results

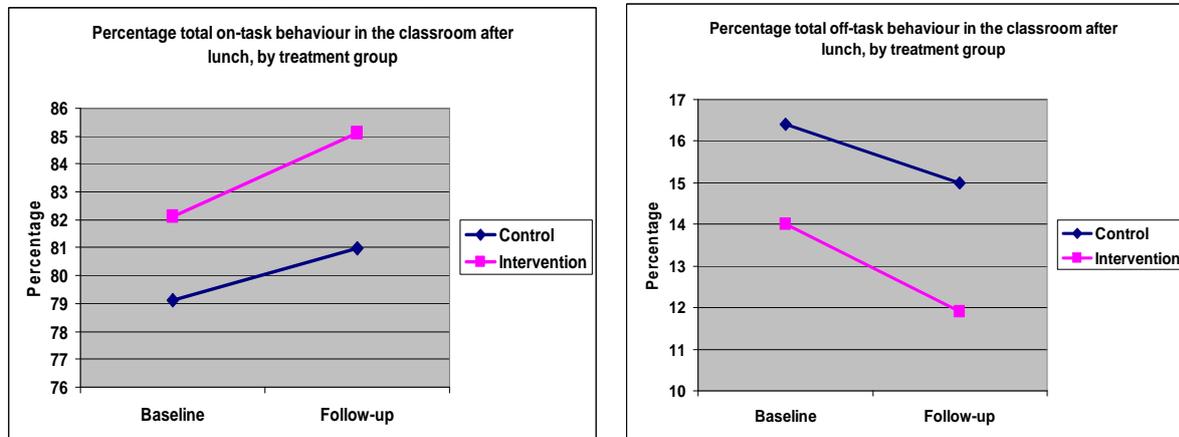
The findings support the hypothesis that improvements to the food and dining environments result in more on-task (concentrating and engaged) and less off-task (disengaged) behaviour. The graphs overleaf show that following intervention there

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<sup>a</sup> This differs from subjective impressions reported in previous studies.

<sup>b</sup> On-task and off-task behaviours are independent of one another, not reciprocal.

was a greater increase in the percentage of total on-task behaviours and a greater decrease in the percentage of total off-task behaviours in the intervention schools compared with control schools. Whilst these differences appear to be small, they are important in terms of the impact on classroom behaviour. The percentages shown reflect 'crude', unadjusted findings that do not take into account potentially confounding factors such as class size, the presence of adults in the classroom in addition to the teacher, number of pupils eligible for free school meals, etc.



An analysis that takes these potential confounding factors into account (as well as the differences at baseline) is shown in Table 1. Results are expressed as odds ratios (OR). The odds ratio expresses the likelihood of a pupil being more or less on- or off-task in the intervention schools compared with the control schools. Values above 1.0 show behaviours that are *more* likely in the intervention schools. Values below 1.0 show behaviours that are *less* likely in the intervention schools. The confidence interval indicates whether or not the result is statistically significant. Confidence intervals that include 1.0 suggest that the intervention has not had an impact and is not statistically significant. P values (level of significance) are also given. Odds ratios are shown for total on-task and total off-task behaviours as well as by social-mode.

**Table 1. Likelihood (OR) of on-task and off-task learning behaviours in intervention schools compared with control schools, by social-mode, taking potential confounders\* into account**

	Odds Ratio*	Confidence interval		P
		Lower limit	Upper limit	
<b>On-task behaviours</b>				
All settings	1.18	1.05	1.33	0.005
By setting:				
• Individual on-task	1.24	0.97	1.58	0.088
• Pupil-pupil on-task	1.04	0.86	1.25	0.716
• Teacher-pupil on-task	0.82	0.64	1.04	0.103
<b>Off-task behaviours</b>				
All settings	0.86	0.75	0.98	0.021
By setting:				
• Individual off-task	0.88	0.68	1.14	0.321
• Pupil-pupil off-task	0.87	0.71	1.06	0.171
• Teacher-pupil off-task	1.03	0.78	1.36	0.82

\* Statistical analysis adjusted for class size (<22 vs. 22 or more), presence of additional adults in the classroom, English as an additional language (EAL), sex, FSM eligibility, SEN status, ethnicity and lunch type (school meal or packed lunch)

The OR for total on-task behaviours (OR=1.18) shows that pupils in the intervention schools were 18% more likely to be on-task following the intervention compared with pupils in the control schools. Pupils in the intervention schools were also 14% *less* likely to be off-task (OR=0.86). On-task and off-task behaviours are independent.

## Discussion

A combined nutrition-environment intervention in the dining room in seven secondary schools in England had a beneficial impact on pupils' learning behaviours compared with that in four control schools. Most of the improved on-task behaviours appeared to derive from pupils working better on their own, while the decrease in off-task behaviours derived from pupils working on their own or interacting with each other.

These findings have important implications for classroom teaching in secondary schools. If pupils are likely to be more on-task and less off-task for up to one third of the time (18% on-task plus 14% off-task), teaching is likely to run more smoothly with fewer disruptions. The net effect of these improvements in behaviour is likely to mean that more time is spent on achieving the objectives of the lesson and less time on activities or discipline needed to retain the pupils focus. The subject matter of the lessons varied, as a wide range of curriculum subjects (science, arts and humanities) were observed. There were too few observations to analyse separately by subject.

It is not clear from the present study what impact such improvements in behaviour may have on academic achievement. It is not unreasonable, however, to assume, that more time spent focused on the subject matter will yield academic benefits.

## Conclusion

This is the first time that improvements in learning-related behaviour in secondary school pupils in a developed country have been objectively assessed following a closely monitored nutrition and dining environment intervention. The underlying causes of the improvements in behaviour and the associated mechanisms need further evaluation. The interventions *per se*, rather than changes in nutritional status, may be responsible for the observed changes, as changes were also observed in the control schools. It could be, therefore, that making healthier food choices and eating in a better management of the dining service may enhance self-esteem, which could then carry over into classroom behaviours associated with better focus on learning. Data concerning changes in behaviour in the dining room (as opposed to the classroom) associated with the intervention are currently being analysed.

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## References

- <sup>1</sup> School Meals Review Panel (2005). Turning the Tables – Transforming School Food: The Development and implementation of nutritional standards for school lunches. [www.schoolfoodtrust.org.uk/UploadDocs/Library/Documents/SMRP\\_Report\\_FINAL.pdf](http://www.schoolfoodtrust.org.uk/UploadDocs/Library/Documents/SMRP_Report_FINAL.pdf)
- <sup>2</sup> Statutory Instrument 2000 No. 1777. *Education (nutritional standards for School Lunches) (England) Regulations 2000*. London: TSO.
- <sup>3</sup> Statutory Instrument 2007 No. 2359. *The Education (Nutritional Standards and Requirements for School Food) (England) Regulations 2007*. London: TSO.
- <sup>4</sup> Statutory Instrument 2006 No. 2381. *The Education (Nutritional Standards for School Lunches) (England) Regulations 2006*. London: TSO.
- <sup>5</sup> School Food Trust. Findings. School lunch and learning behaviour in primary schools: an intervention study. London. School Food Trust. 2008.

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