

Parental provision and children's consumption of fruit and vegetables did not increase following the Food Dudes programme

Abstract:

Purpose: This study is based on previous research which suggests that the Dudes programme increases children's fruit and vegetable consumption for school provided meals by assessing its effectiveness in increasing the provision and consumption of fruit and vegetables in home-provided meals.

Design/methodology/approach: Two cohorts of children participated from 6 schools in the West Midlands in the UK, one receiving the Food Dudes intervention and a matched control group who did not receive any intervention. Participants were children aged 4-7 years from 6 primary schools, 3 intervention (n=123) and 3 control schools (n=156). Parental provision and consumption of fruit and vegetables was assessed pre-intervention, then 3 and 12 months post-intervention. Consumption was measured across five consecutive days in each school using digital photography.

Findings: No significant increases in parental provision or consumption were found at 3 or 12 months for children in the intervention schools however increases were evident for children in the control group.

Research limitations/implications: Further development of the Food Dudes programme could develop ways of working with parents and children to increase awareness of what constitutes a healthy lunch.

Originality/value: This is the first independent evaluation to assess the influence of the Food Dudes programme on parental provision and children's consumption of lunchtime fruit and vegetables.

Keywords: children; nutrition, eating, parents, school, health promotion Article
Classification: Research Paper

Introduction

The English Department of Health (2000) recommend that adults and children over the age of two years should consume at least five portions of fruit and vegetables per day due to the associated long-term health benefits (Boeing *et al.*, 2012; O'Flaherty *et al.*, 2012) However, evidence suggests that many children in the UK do not consume adequate levels of fruit and vegetables (The Health and Social Care Information Centre, 2012) which has resulted in a number of initiatives to improve children's eating habits, including the School Fruit and Vegetable Scheme (SFVS) and the introduction of the food and nutrient based standards (School Food Trust, 2008). However, whilst the SFVS has increased children's snack time consumption of fruit and vegetables (Department of Health, 2010) and the food and nutrient based standards have improved the nutritional content of school-supplied meals (Haroun *et al.*, 2010), evidence suggests that only 44.1% of children choose to consume school meals with the majority of children opting to bring in lunches from home (Nelson *et al.*, 2012).

It is known that the nutritional content of packed lunches is far lower than that of school-supplied meals (Rees *et al.*, 2008), containing only half the recommended amount of fruit and vegetables (Rogers *et al.*, 2007). As a result, schools are encouraged to develop lunch box policies that support a whole-school healthy eating environment (School Food Trust, 2011). However, such policies may be difficult to implement as they require engagement with both parents and children in addition to involvement of the school. Consequently, school-based interventions, such as the Food Dudes programme, which aim to improve children's fruit and vegetable consumption, are also recommended. Evidence suggests that the Food Dudes programme can increase children's lunchtime fruit and vegetable consumption (Horne *et al.*, 2004; Horne *et al.*, 2009; Lowe *et al.*, 2004) and also produce long lasting increases in the provision of fruit, vegetables and juices for children consuming home supplied lunches (Horne *et al.*, 2009). However, studies conducted in the UK have mainly focused upon school-supplied meals, neglecting those supplied from home. It is therefore important that the effectiveness of the Food Dudes programme in increasing fruit and vegetable consumption, including those eating home-supplied lunches, is explored.

The aims of the present study were therefore twofold: firstly, to investigate the effectiveness of the Food Dudes programme in increasing the provision and consumption of fruit and vegetables for children consuming home-supplied meals; and secondly, to establish the extent to which the programme is able to influence long-term maintenance (12 months post intervention) of any behaviour changes observed.

Methods

This study formed part of a large scale independent evaluation of the Food Dudes programme (See Upton *et al.*, 2012).

Design

Two cohorts of children participated in the study; one receiving the Food Dudes intervention and a matched control group who did not receive the intervention. The impact of the Food Dudes programme on provision and consumption of fruit and vegetables was assessed at baseline (prior to the intervention), 3 month follow-up (post intervention) and 12 month follow-up.

Participants

The programme was evaluated in 6 primary schools in the West Midlands, UK. Participants were 279 children aged between 4-7 years, 123 in the intervention schools (70 boys and 53 girls) and 156 in the control schools (85 boys and 71 girls). Intervention schools were selected by the local health authority and control schools matched as far as possible in terms of: school size, proportion of children entitled to free school meals and proportion of children from ethnic minorities.

Food Dudes Intervention

The Food Dudes programme consists of an initial 16 day intervention phase during which children watch a series of DVD episodes of the Food Dudes adventures. The Food Dudes are four super-heroes who gain special powers by eating their favourite fruit and vegetables that help them maintain the life force in their quest to defeat General Junk and the Junk Punks. The Dudes encourage children to 'keep the life force strong' by eating fruit and vegetable every day. Class teachers also read letters to the children from the Food Dudes to

reinforce the DVD messages. During the intervention, children are given rewards for either tasting or consuming both the target fruit and vegetables. Children are also provided with a Food Dudes home pack containing information and tips for parents on healthy eating to encourage children to eat fruit and vegetables at home as well as school (Lowe *et al.*, 2004). Following the intervention, a maintenance phase of up to one year is implemented during which fruit and vegetable consumption is encouraged, but with less intensity than the intervention phase. Classroom wall charts are used to record consumption of fruit and vegetables and children are rewarded with further Food Dudes prizes and certificates. This phase of the programme aims to enable the school to develop a self-sustaining approach to rewarding fruit and vegetable consumption and a culture of healthy eating (Lowe and Horne, 2009).

Procedure

The same procedure was employed in both the intervention and control schools at each study phase and measures were recorded across five consecutive days in each school. Baseline data were recorded in June 2010, 3 month follow-up during October 2010 (due to school summer holidays) and 12 month follow-up in June 2011. In line with guidelines developed by the Health Promotion Agency (2009) a child's portion of fruit or vegetables was defined as 40g. Control schools remained under baseline conditions during the 16 day intervention phase. At the start of the day, lunchboxes were labelled with the child's ID number, name and class and a digital photograph taken of lunchbox contents after morning break (See Figure 1). Following lunchtime, lunchboxes were collected and a photograph taken of any leftovers (See Figure 2). Lunchtime staff instructed children to leave any uneaten food or packaging in their lunchboxes at the end of lunchtime. All rubbish bins were located away from tables to ensure that the children did not throw any food items away and also enabling close monitoring of food disposal by the research team.

The number of portions of fruit, and vegetables consumed was visually estimated on a five point likert scale (0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1). Inter-rater reliability analysis was performed using correlation to determine consistency among raters. Agreement was calculated for 10% (n=28) of the study sample at baseline and was found to be excellent ($r(26) = .94, p < 0.01$).

Figure 1. Example of a lunchbox, pre-consumption



Figure 2. Example of a lunchbox, post-consumption



Ethical approval

Ethical approval was gained from the University of Worcester research ethics committee. Consent was sought from head teachers acting in loco parentis supplemented by parental “opt-out” consent whereby the child is included in the study unless their parents withdraw them (Severson and Biglan, 1989). A letter detailing the purpose of the study was sent to parents prior to the baseline phase and again at 3 and 12 month follow-up with the option to notify the class teacher by the specified date if they did not wish for their child(ren) to participate.

Data analysis

Mean values were computed for each child to provide an indication of the average amount of fruit and vegetables provided and consumed with the criterion that data were available for a minimum of 3 out of 5 days during each phase. Data were analysed using the Statistical

Package for Social Science version 19.0 (IBM, USA) and differences in consumption tested using repeated measures ANOVA. Paired t tests determined the source of any variance and effect sizes, using Cohen's d, were calculated to establish practical significance. An α level of 0.05 was used in all statistical analyses unless otherwise stated.

Results

Figure 3 shows mean provision of fruit and vegetables in the intervention and control schools. Analysis of fruit and vegetable provision indicated a significant main effect of study phase ($F(2, 276) = 12.10, p < 0.01, \eta_p^2 = 0.08$) but not school setting ($F(1, 277) = 3.34, p > 0.05, \eta_p^2 = 0.01$). The interaction between time and school setting was also not significant ($F(2, 276) = 0.74, p > 0.05, \eta_p^2 = 0.005$). Post hoc t tests (bonferroni adjustment, $0.05/5 = 0.025$) indicated no significant difference between the intervention and control schools in parental provision of fruit and vegetables at baseline ($t = -0.95, p = 0.34, d = 0.11$). Within group comparisons suggested that in the intervention schools, parental fruit and vegetable provision was not statistically higher at 3 month follow-up compared to baseline ($t = 2.22, p = 0.03, d = 0.28, CI = 0.16-0.38$) or between baseline and 12 month follow-up ($t = 1.08, p = 0.28, d = -0.14, CI = -0.24$ to -0.04). However, in the control schools parental provision of fruit and vegetables was statistically higher between baseline and 3 month follow-up ($t = -4.01, p < 0.00, d = 0.46, CI = 0.36-0.54$) but not between baseline and 12 month follow-up ($t = -0.56, p = 0.58, d = 0.07, CI = -0.03-0.16$).

Figure 3. Mean provision (in portions) of fruit and vegetables (N=279)

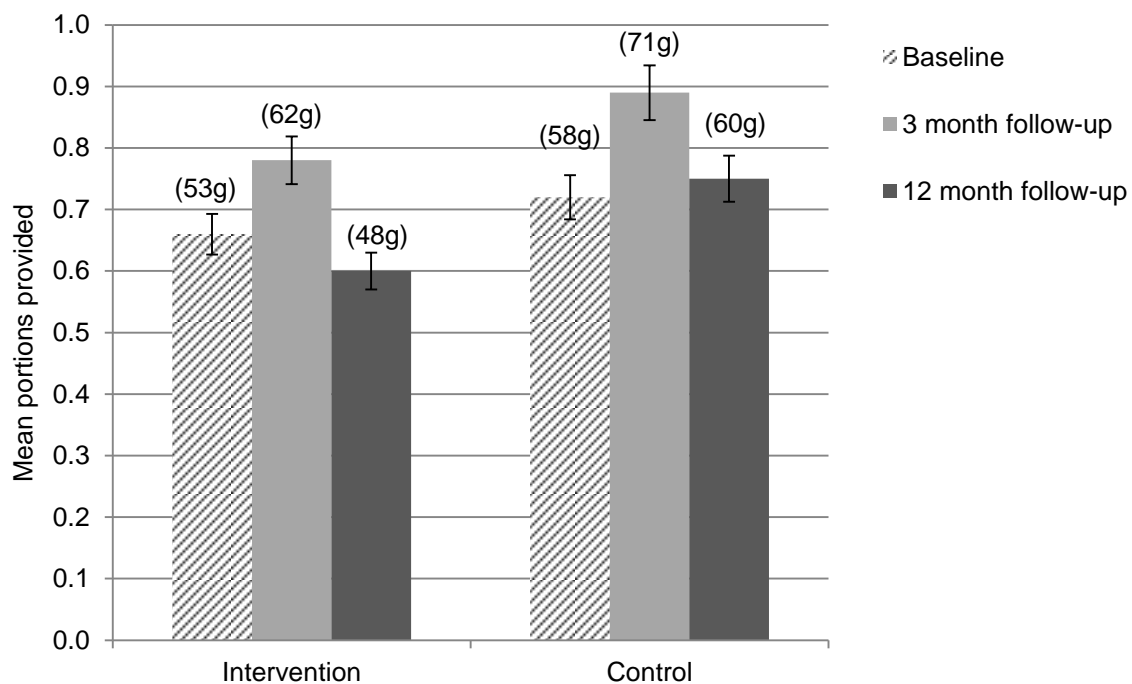
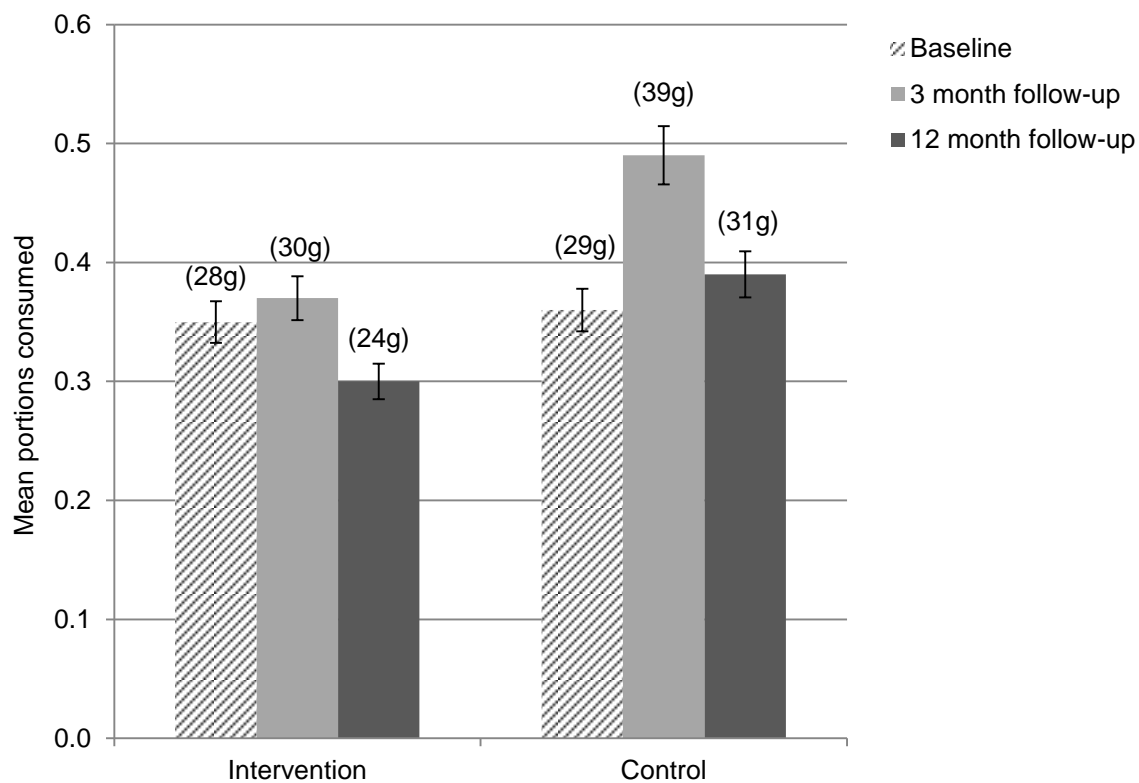


Figure 4. Mean consumption (in portions) of fruit and vegetables (N=279)



Mean consumption of fruit and vegetables in the intervention and control schools is shown in Figure 4. Results indicated a significant main effect of time ($F(2, 276) = 4.80, p < 0.01, \eta_p^2 = 0.03$) but not school setting ($F(2, 277) = 2.78, p > 0.05, \eta_p^2 = 0.01$). The interaction between study phase and school setting was also not significant ($F(2, 276) = 1.63, p > 0.05, \eta_p^2 = 0.01$). Post hoc t tests (bonferroni adjustment, $0.05/5 = 0.025$) suggested no significant difference between the intervention and control schools in fruit and vegetable consumption at baseline ($t = -0.12, p = 0.90, d = 0.02$). Within group comparisons indicated that, in the intervention schools, consumption of fruit and vegetables was not significantly higher at either 3 or 12 month follow-up relative to baseline ($t = -0.60, p = 0.55, d = 0.08, CI = 0.01-0.16$ and $t = 1.05, p = 0.29, d = 0.16, CI = -0.24 - -0.09$ respectively). In the control schools, mean fruit and vegetable consumption was statistically higher at 3 month follow-up than at baseline ($t = -3.08, p = 0.002, d = 0.35, CI = 0.27-0.42$) but not at 12 month follow-up ($t = -0.98, p = 0.33, d = 0.09, CI = 0.02-0.16$).

Discussion

This study indicated that the Food Dudes intervention did not lead to short or long-term increases in parental provision of lunchbox fruit and vegetables. Likewise, the intervention did not result in significant increases in consumption of fruit and vegetables at either 3 or 12 month follow-up. In contrast, significant increases in fruit and vegetable provision and consumption were evident in the control schools, and with a medium effect size, suggesting that these increases were of moderate practical significance. However, the non-significant interaction effects for both parental provision and consumption indicate that changes in the provision and consumption of fruit and vegetables over time did not reflect a programme effect and therefore must be attributed to another influence. Nevertheless, no statistically significant baseline differences were evident between the intervention and control schools in terms of provision or consumption of fruit and vegetables.

Schools were matched as far as possible in terms of: school size, proportion of children entitled to free school meals and proportion of children from ethnic minorities to control for differences in participant demographics. Furthermore, to our knowledge no form of healthy eating intervention was implemented in the control schools during the study which may have contributed to the increases in parental provision or consumption however we cannot be certain that this was not the case. If any form of health promotion programme was implemented during the course of the study, this may have impacted on study findings. Indeed, many, if not all schools are committed to developing whole school approaches to enhance the health and educational outcomes for children and young people and may choose to implement their own health promotion programme independent of interventions such as the Food Dudes programme.

Previous research (Horne *et al.*, 2004; Lowe *et al.*, 2004) has largely focused on school-provided meals and not those supplied from home. Whilst one study (Horne *et al.*, 2009) did report increases in parental provision and consumption of fruit and vegetables following the intervention, this study was conducted in Ireland where, unlike the UK, there is no school meal provision and children instead bring in their lunch from home (Horne *et al.*, 2009). Therefore it is possible that there was greater parental involvement or information provided to parents in the programme implemented in Ireland than in the UK. The inability of the

present study to replicate these findings suggests that further evidence is required to investigate the potential of the intervention to change fruit and vegetable provision and consumption for home-provided meals in a UK context. In contrast to school provided meals which are required to adhere to food and nutritional based standards (School Food Trust, 2008), there are no such guidelines for meals provided from the home. Consequently, the ability of the intervention to modify parental provision and consumption of lunchtime fruit and vegetables may be more difficult to establish as it requires behaviour change from both children and parents.

Further development of the Food Dudes programme in the UK could develop ways of working with parents and children to increase awareness of what constitutes a healthy lunch (Rogers *et al.*, 2007). Indeed, we are aware that the programme is currently being developed with this in mind through the implementation of the Food Dudes Forever phase which is designed to strengthen the changes in dietary behaviours following the initial phase of the programme (Lowe, 2013).

Strengths of the study

A particular strength of this study is the use of digital photography for measuring dietary intake. Evaluations of such interventions should be based upon robust measures of dietary intake (Klepp *et al.*, 2005) however many evaluations of interventions designed to increase children's fruit and vegetable consumption rely on self-report measures, which are clearly limited by the ability of respondents (in this case children) to accurately recall and record consumption. In contrast, the present study used digital photography, which offers a pragmatic and reliable tool for assessing consumption in the school setting (Swanson, 2008). This method is particularly effective for studies that require rapid acquisition of data and minimal disruption to the eating environment such as the study reported here (Williamson *et al.*, 2003).

Conclusion

In conclusion, the results offer no support for the effectiveness of the Food Dudes intervention in increasing parental provision or consumption of lunchtime fruit and vegetables for children consuming home-provided meals. Clearly further development work is required to ensure both the short and long term effectiveness of interventions promoting

fruit and vegetable consumption in children such as the Food Dudes programme. The Food Dudes Forever phase (Lowe, 2013) of the programme currently underway is one approach that may enhance the short and long term effects of the programme on children's eating habits.

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