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Research Article

School Meal Contribution to Nutrient Intake Amongst 11-14 Years Old Scottish School Children

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Abstract

Objective: To assess nutrient intake of children who buy lunch in school, outside school, or bring a packed lunch to school, and compare this with the nutrient standards.

Methods: Secondary school pupils aged 11-14 years (n 332) from two secondary schools in Fife, Scotland, were asked to complete food diaries for a period of five days (Monday to Friday) to record foods and drinks consumed and portion sizes. Nutritional analysis of the diaries was carried out in respect to ten key nutrients/foods for which standards had been defined in the Scottish Nutrient School Standards for Lunches (SNSSL). Descriptive statistics were compiled for each lunch type and analysis was conducted to investigate the importance of the lunch time meal.

Results: Around a third of pupils (32.8%) habitually had canteen lunches. The mean energy intake of canteen lunches was 504 kcal (2109kJ), compared with 556 kcal (2326kJ) for packed lunches and 707 kcal (2958kJ) for lunches bought outside of school ('street lunches'). Canteen lunches provided the 'most nutritious lunch', with street lunches providing the 'least nutritious lunch'.

Conclusions: The findings from this study emphasise the importance in canteen lunches in terms of nutritional quality as well as quantity, especially in terms of fat and SFA. Even if the overall menu, considered over a week, may meet SNSSL, this study indicates that (owing to food choices made by children in the canteen) the actual lunchtime nutrient intakes of children consuming canteen lunches were often far from achieving the nutritional standards.

Keywords: *Nutrient content; School lunch; Packed lunch; Secondary school*

Introduction

Childhood obesity and nutrition are high on the UK policy agenda because of their association with chronic illnesses and related costs[1,2]. It is important to establish healthy eating patterns and food preferences at an early age as these tend to persist into adult life [3] and evidence indicates that many chronic diseases have their roots in the early years [4].

School lunches contribute significantly to children's food intake; therefore, nutritious school lunches have the potential to enhance the nutritional quality of unbalanced diets [5]. There is currently a great deal of activity to improve the diet of the nation's schoolchildren and public health policy can be a means of propelling this momentum to effect real change. Scotland has led the way in the UK in terms of transforming school food [6]. The report of Scotland's Executive Panel on School Meals *Hungry for Success* (2003)[7], set out a whole school approach to school meals, based around the introduction of nutrient-based standards for school meals. The report included Scottish Nutrient Standards for School Lunches (SNSSL) [8], which are based on the Eating for Health model for healthy eating (developed by the Health Education Board Scotland, in 1996) and the Caroline Walker Trust recommendations [9]. The SNSSL states that a school lunch should provide approximately no more than one third of a child's intake of salt, saturated fatty acids (SFA) and non-milk extrinsic sugar (NMES), and at least one third of their intake of protein and non-starch polysaccharides, and micronutrients including vitamin A and vitamin C. For calcium, a higher level of 35% was set, and for iron and folate 40%, because these nutrients are particularly important for adolescents, and adequate levels have been found to be hard to achieve in practice [7]. The nutrient standards also state that a school lunch should contain at least two portions of fruit and vegetables. The SNSSL were adopted by all Scottish special and primary schools by December 2002, and secondary schools by December 2006. New standards, The Nutritional Requirements for Food and Drink in School (Scotland) Regulations, were introduced in 2008 [10]. These new nutrient standards include the addition of zinc, due to public health concerns regarding children's zinc intakes, and a phased approach to the maximum level set for sodium, to make this more achievable for schools. In addition, the minimum values for several nutrients were set at 30%, 35% or 40% of the RNI in the previous SNSSL [8], however, the new Regulations [10] set all the minimum standards at 30% of the RNI, in line with the energy standard.

A few decades ago, schoolchildren's lunch options would have been a school lunch, a packed lunch from home, or returning home for lunch. More recently, children at secondary schools in Scotland have been afforded more freedom regarding leaving school premises at lunchtime, and consequently the nature of the lunches consumed has changed. Much previous research on children's lunchtime food intake omitted lunch options apart from canteen or packed lunches [11-14]. Data from 2013 indicate that 43.7% of secondary school children in Scotland choose school meals [15]. The other main lunch options are packed lunches or 'street lunches' (lunches purchased outside of school). The present study is believed to be the first to investigate the significance and impact of these lunch options in detail. Although, the nutrient standards for school lunches have been successfully implemented in Scotland, no assessment has been made on their impact on children's diets [16]. This study was conducted to measure the nutrient intake of children who have a school canteen lunch, buy lunch outside of school or bring a packed lunch to school, and to compare this with the SNSS [8].

Methods

Recruitment

Schoolchildren aged 11-14 years were recruited from two local secondary schools attended by pupils from families with similar socioeconomic profiles. Data were collected between September 2007 and January 2008. The student populations in the two schools were around 900 pupils and 1800 pupils. Both schools had similar catchment areas which included local authority housing, shared ownership, as well as private ownership. Informed consent by-proxy was obtained by the parents or guardians of the school children. The author participated in school assemblies to introduce the project to the children, and also attended food technology classes prior to data collection to explain the study further, and answer questions from pupils.

Dietary assessment

Diet diaries were used for a period of five whole days (Monday to Friday) to record food and drinks consumed, portion sizes and the name and nature of the outlet(s) where food was purchased. Diet diaries, information packs giving useful tips and information on how to complete the food diaries, and large sealable plastic envelopes for returning the diaries and retained food wrappers, were distributed to all participating pupils during their food technology lessons. Participants were asked to consume their normal diets. To maximise accuracy, participants were asked to provide as much detail as possible, including portion size in grams or millilitres for pre-packaged foods, and descriptions of portion sizes for other foods, which were estimated using Food Portion Sizes [17]. To minimise any effect on participant behaviour by the study, pupils were reassured of their anonymity and that there were no 'wrong' answers, with the aim of maximising the honesty of the reports and answers. The author (CN) also visited the school canteens to meet with kitchen staff and determine the portion sizes of prepared dishes (including sandwiches, wraps and filled rolls), and to record the portion or pack sizes of manufactured foods and drinks. The children purchasing street lunches often took advantage of 'meal deals' offered by a local baker, and included items such as jumbo sausage rolls and doughnuts. These were observed to be significantly larger than the portion sizes described in Food Portion Sizes [17], so an example of each item was purchased and weighed. Completed diaries, along with any food wrappers and packaging, were placed in the plastic envelopes provided and handed to the home economics teachers, for collection by the author.

Data analyses

Nutritional analysis of the diaries was carried out using Win Diets computer software [18]. The lunches studied were defined as food eaten during the school lunch break, which had been purchased from the school dining room (canteen lunch), brought from home (packed lunch), or purchased outside school (street lunch). Since this study was mainly concerned with school meal choices and their influence on nutrient intakes at lunch time, ten key nutrients/foods for which standards had been defined were selected from those covered by the SNSSL [8] in place at the time of this study. For the purposes of this study, the nutrients/foods considered were: energy, fat, SFA, Non-Milk Extrinsic Sugars (NMES), Non-Starch Polysaccharides (NSP), vitamin A, folate, calcium, iron, and fruit and vegetable portions.

Some lunches comprised food from more than one lunch type, for example a pupil who had a canteen lunch but supplemented it with food purchased outside school (street lunch). These lunches were categorised as 'mixed'. A further category of 'skipped' lunches was also included for children who completed a full day's diary but had no food at lunchtime. Rather than ignore the data from children not having a habitual lunch choice (not choosing the same option on four or more days), each day was considered as the unit of sampling, rather than each child. The analyses follow the approach of Stevens and Nelson (2011) [19], with each day considered as the unit of sampling, rather than each child.

Regardless of the number of days completed by a child, a day was included in the analysis if it was judged by the author to be trustworthy on the basis of feasibility. For example, sometimes a diet diary day would include only one item such as a packet of crisps. In such cases, it was assumed that the child had not recorded everything they had consumed and that day's data was not included in the analysis.

Data analysis was performed using SPSS for Windows statistical software package version 21 (SPSS Inc., Chicago, IL, USA). Descriptive statistics (mean and standard deviation) of nutrient and food intakes were compiled for each lunch type. A one-sample t-test was used to compare mean nutrient intakes for each lunch type with the SNSSL to determine whether there was a significant difference between the actual mean lunchtime intake and the Standard. Mean lunchtime intakes were also calculated as a percentage of the SNSSL target. Lunch time nutrient density was calculated to enable another means of comparison of the lunch types. To relate the present study to the SNSSL, nutrient densities for a hypothetical lunch that precisely met the SNSSL standards were also calculated. For example, the SNSSL states that a lunch should contain 646kcal and 350mg calcium. Therefore, a lunch that exactly meets the SNSSL would contain 646/350 x 100 = 54.18mg per 100kcal/418kJ.A one-sample t-test was used to compare the nutrient density of lunches with the hypothetical lunch density. One-way ANOVA and post-hoc comparisons using Tukey's tests were used to compare the nutrient content of the three lunch types.

Results

A total of 332 pupils were recruited to the study, with 261 pupils completing the diet diaries for all five days (Table 1). The total number of male and female days in each lunch group were very similar (Table 2), therefore the genders were analysed together. Many pupils (n= 128, 38.6%) did not have the same lunch type every day. Of the 332 pupils, 204 habitually consumed one type of lunch:32.8% habitually had canteen lunches, 15.1% packed lunches and 13.6% had street lunches.

Although possible, no pupil was found to have food from all three sources. Considering the total number of lunches (n= 1532) analysed in this study, a small number of lunches were mixed (more than one lunch type) (n= 134, 8.7%) and a very small number skipped lunches (n= 8, 0.5%). These were excluded from the statistical analysis.

Mean nutrient intakes for each of the three lunch types were significantly different from the SNSSL standard, with the exception of SFA in the canteen lunches (p= 0.114), and fat (p= 0.283) and vitamin A (p= 0.111) in the packed lunches (Table 3). To provide a more precise indication of the extent to which the average lunch of each type met the official standards, mean lunchtime intake as a percentage of the SNSSL target was calculated (Table 4). To provide an indication of the actual number of lunches of each type that met the official standards, each lunch was compared to the SNSSL standard (Table 5). For example, 78% of canteen lunches, 52% of packed lunches and 40% of street lunches met the SNSSL standard for fat.

Canteen lunches showed the most favourable intake for: total fat, SFA, NMES, NSP, folate, calcium and iron. The least favourable intake for any nutrient was not found with canteen lunches. Packed lunches showed the most favourable intake for vitamin A and fruit and vegetable portions and the least favourable intake of total SFA, NSP and iron. Street lunches did not show the most favourable intake for any nutrient and showed the least favourable intake of total fat, NMES, vitamin A, folate, calcium, and fruit and vegetable portions.

Nutrient densities for a hypothetical lunch that precisely met the SNSSL standards are presented in table 6. In order to provide a measure of closeness of nutrient density in the present study to the hypothetical 'target' lunch which precisely met the SNSSL, nutrient density of lunches in the study were compared with the nutrient density of the hypothetical lunch density using one-sample t-tests. Canteen lunches had a nutrient density for fat significantly lower than that for a hypothetical lunch exactly meeting the SNSSL standard. The fat densities for packed and street lunches were significantly greater than that for a hypothetical lunch meeting the SNSSL standard. Mean nutrient densities for all three lunch types were higher for SFA, and NMES and lower for NSP, folate, calcium, iron and fruit and vegetables than that of a hypothetical lunch meeting the SNSSL standard. The high standard deviation for mean vitamin A, and fruit and vegetables correlates with the characteristic high variability of intake for vitamin A and fruit and vegetables.

Discussion

Although the sample's total lunchtime energy intake was close to the Estimated Average Requirement (EAR), the children showed excessive intakes of fat, SFA and NMES, and insufficient intakes of NSP, vitamin A, folate, calcium and iron. The deficiency in children's fruit and vegetable intake was also substantial. This study indicates that the mean lunchtime nutrient intakes for canteen, packed and street lunches rarely meet the SNSSL requirements. The only SNSSL requirements achieved were for fat, SFA and NMES in canteen lunches, and vitamin A in packed lunches.

There were statistically significant differences ($p< 0.001$) between the energy intakes from each of the lunch types in the present study. Post-hoc comparisons using Tukey's test indicated that the mean energy intake for canteen and packed lunches were both significantly lower than that for street lunches, and the mean energy intake of canteen lunches was significantly lower than that for packed lunches. There were also significant differences between each lunch type and the SNSSL. Street lunches exceeded the SNSSL by 9%, and since many of the foods consumed were low in NSP and micronutrients, and high in fat, SFA and NMES, these extra calories did not appear to make a positive nutritional contribution to the children's lunch. The energy content of packed lunches was 14% below the standard, and that of canteen lunches 22% below. When compared with the SNSSL lunchtime energy target of 646kcal/2.7MJ, the mean energy intake for packed lunches (556kcal/2.3MJ) and especially canteen lunches (504kcal/2.11MJ) was less than this value.

Street lunches contained the fattest, followed by packed lunches, with canteen lunches providing the least. However, in terms of nutrient density for fat, there was no difference between packed and street lunches suggesting that street lunches were not richer in fat than packed lunches but simply larger. This suggests that for street lunches, at least part of street lunches' 'fattiness' was due to the quantity of food eaten, rather than the children consuming a higher proportion of high-fat foods.

While the amount of SFA in street lunches was much higher than canteen lunches, the difference in SFA density between the two lunch types was not statistically significant. This indicates that the nutritional quality of the two lunches (as regards SFA) was not significantly different, but that the larger amounts consumed by children eating street lunches led to their consuming more saturated fat.

Canteen lunches contained significantly less NMES than packed or street lunches, and their nutrient density for NMES were also significantly lower. However, while packed lunches contained significantly less NMES than street lunches, their nutrient density was not significantly different, suggesting that street lunches are not solely high in NMES because they are particularly rich in NMES, but also due to the amount of food consumed. Street lunches were significantly higher in NMES (nearly double the SNSSL target), than canteen and packed lunches in the present study.

The difference in the amount of NSP consumed as part of canteen, packed and street lunches was not statistically significant. However, the nutrient density for NSP seen in canteen lunches was higher than that for packed or street lunches, suggesting that foods richer in NSP were being consumed as part of canteen lunches.

Packed lunches provided the most vitamin A, followed by canteen lunches, with street lunches providing the least; the difference in vitamin A content between the groups was significant. However, the level of significance for the amount of vitamin A between packed (the greatest amount) and canteen lunches (the intermediate amount) was greater than the difference in vitamin A density between the two groups. This suggests that at least some of the benefit of the packed lunches' vitamin A content is due to their larger size, rather than the extent to which they are denser in this nutrient than canteen lunches.

Canteen lunches had the highest intake and nutrient density for folate, followed by packed lunches, with street lunches providing the least. Street lunches contained less calcium than packed or canteen lunches. However, although there was no difference in the calcium intake from canteen and packed lunches, the nutrient density for this mineral was significantly higher among canteen lunches. This suggests that if children consuming canteen lunches could be encouraged to eat more, and the nutrient composition remains unchanged, their calcium intake could be boosted.

Canteen lunches contain more iron than packed or street lunches, but the difference in iron content between street and packed lunches was not significant. However, the nutrient density for iron was significantly greater for packed lunches than street lunches, suggesting that children consuming street lunches are eating larger quantities of iron-poor foods. The iron contents of the three lunch types in the present study were similar, and the only difference reaching statistical significance ($p < 0.05$) was that between canteen lunches (highest content) and street lunches (lowest content). All three lunch types failed to achieve the SNSSL for iron by a similar and extensive amount, providing between only 32-36% of the SNSSL standard.

Packed lunches contain the most fruit and vegetables, followed by canteen lunches, with street lunches containing the least; the differences between each group were significantly different. However, the difference in terms of fruit and vegetable density between packed and canteen lunches was not statistically significant. Also, the amount of fruit and vegetables consumed by all of the children was extremely low. This suggests that, compared to canteen and street lunches, packed lunches are no richer in fruit and vegetables (per calorie consumed) - the children could be simply eating more food. The most extreme failures of the SNSSL targets were seen in street lunches' NMES and fruit and vegetable intakes, with mean lunchtime NMES intake exceeding the SNSSL maximum set by 97%, and the mean lunchtime fruit and vegetable intake providing only 5% of the SNSSL minimum.

When lunch time nutrient densities for fat, SFA and NMES were considered, the ranking changed from that for nutrient intakes. For fat and SFA, packed lunches (with their lower calorie content) showed a higher percentage of fat and SFA calories in the meals than street lunches. It was noted that many of the packed lunches contained cheese and processed meats, which could at least partially account for this. The large quantities of food consumed in street lunches also led to the consumption of high intakes of fat, SFA and NMES. Compounding this effect, many foods consumed during street lunches (for example sausage rolls, doughnuts, deep-fried chips, and sugar-sweetened beverages) were high in these macronutrients. Regarding NMES, street lunches showed the least favourable nutrient profile in terms of both the excessive quantity consumed, and the percentage of lunchtime calories contributed by NMES (a higher proportion than for packed or canteen lunches).

Only three other UK studies which considered the three lunch groups analysed in the present study are known to the authors. Two of these studies were carried out over 25 years ago [20,21]. The third of these studies was the secondary analysis of the FSA Survey of sugar intake among children in Scotland [22]. These three studies categorized children to a habitual lunch type, in contrast with the present study which analysed days, including each particular lunch type. In effect the other studies sacrificed some accuracy by classifying children to a particular lunch type most (but not necessarily, every) day, in order to concentrate on how a child's usual behaviour affects their nutrition.

Data from more recent studies that compared the lunchtime nutrient intake of secondary school pupils taking school lunches and packed lunches also found that school lunches generally had a more favourable nutrient intake [11,12].

In terms of nutrient intake, this study found that canteen lunches were the significantly superior lunchtime meal option for fat, SFA, NMES, folate, calcium and iron. Packed lunches were found to be a significantly superior lunchtime meal in terms of vitamin A, and fruit and vegetables. However, when nutrient density was considered, canteen lunches were found to be superior in the case of all nutrients except SFA and fruit and vegetables. Street lunches showed the least favourable (mean values) for all nutrients except SFA and iron (packed lunches were least favourable for SFA and iron). The most extreme deficiencies in intake (for all lunch types) were seen for iron, and even more so for fruit and vegetables.

Limitations

The present study maximised the number of lunch type days categorizing data into 'days' rather than 'children'. However, this lost the ability to obtain conclusions regarding children's habitual behaviour. However, the authors appreciate that a child could appear across different lunch types and therefore the analysis is not entirely independent. The approach used in this paper follows that used by Stevens and Nelson (2011) [19].

Conclusions

Canteen lunches provided the 'most nutritious lunch' followed by packed lunches, with street lunches providing the 'least nutritious lunch'. The findings above emphasise the importance in canteen lunches in terms of nutritional quality as well as quantity, especially in terms of fat and SFA. However, even if the overall canteen menu, considered over a week may meet SNSSL, this study indicates that (owing to food choices made by children in the canteen) the actual lunchtime nutrient intakes of children consuming canteen lunches were often far from the standards set. The lunchtime meal is undoubtedly an important part of the total food intake; however, it is the total daily diet that affects children's health, both now and in the future. We have reported, in a separate paper, analyses on the impact of lunch type on daily nutrient intakes. Considerable resources have been invested in improving the nutritional quality of school meals (canteen lunches), and increasing their uptake. However, if children eating packed lunches, which are nutritional inferior in some respects, and street lunches, which have been found to be nutritionally poor, compensate by eating healthier food outside the school lunchtime, their total daily intakes could still be acceptable.

	Number of days' records				
	5	4	3	2	1
School A	181	12	11	6	2
School B	80	15	21	2	1
Total	261	28	32	8	3

Table 1: *Number of pupils completing 5, 4, 3, 2 or 1 day of records.*

	Lunch type			Total
	Canteen N (%)	Packed N (%)	Street N (%)	N (%)
Male	323 (48.8)	144 (21.8)	195 (29.5)	662 (100)
Female	362 (49.2)	165 (22.4)	209 (28.4)	736 (100)
Total	685 (100)	309 (100)	404 (100)	1398 (100)

Table 2: *Number of days' data from males and females.*

Note: Figures exclude the 134 mixed lunches

Nutrient	SNSSL	Lunch type, mean (SD)								
		Canteen (n = 685)			Packed (n = 309)			Street (n = 404)		
		Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
Energy (kcal)	646	505	237	<0.001	557	202	<0.001	707	293	<0.001
(MJ)	2.7	2.1	1.0	<0.001	2.3	0.8	<0.001	3.0	1.2	<0.001

Fat (g)	25.1	18.1	10.4	<0.001	26.0	13.5	0.283	32.2	16.4	<0.001
SFA (g)	7.9	7.6	5.3	0.114	11.8	8.2	<0.001	10.8	6.5	<0.001
NMES (g)	18.0	15.8	13.7	<0.001	24.6	21.7	<0.001	35.4	30.8	<0.001
NSP (g)	5.2	3.0	1.9	<0.001	2.6	1.6	<0.001	2.8	2.1	<0.001
Vitamin A (µg)	185	129	148	<0.001	200	168	0.111	97	151	<0.001
Folate (µg)	80	50	29	<0.001	40	29	<0.001	30	29	<0.001
Calcium (mg)	350	237	166	<0.001	221	175	<0.001	178	178	<0.001
Iron (mg)	5.9	2.1	1.1	<0.001	1.8	1.0	<0.001	2.0	1.3	<0.001
Fruit & vegetable (portions)	2	0.3	0.5	<0.001	0.5	0.7	<0.001	0.1	0.3	<0.001

Table 3: *Nutrient intake, mean and standard deviation (SD) plus comparison with SNSSL requirements: canteen, packed and street lunches. Paired t-test; SNSSL: Scottish Nutrient Standards for School Lunches (8) SD: Standard deviation; SFA: Saturated Fatty Acids; NMES: Non-milk extrinsic sugars; NSP: Non Starch Polysaccharides*

Nutrient	SNSSL	Percentage of SNSSL		
		Canteen	Packed	Street
Energy (kcal/MJ)	646/2.7	78%	86%	109%
Fat (g)	25.1	72%	**104%**	**128%**
SFA (g)	7.9	96%	**149%**	**137%**
NMES (g)	18.0	88%	**137%**	**197%**
NSP (g)	5.2	**58%**	**50%**	**54%**
Vitamin A (µg)	185	**70%**	109%	**52%**
Folate (µg)	80	**63%**	**50%**	**37%**
Calcium (mg)	350	**68%**	**63%**	**51%**
Iron (mg)	5.9	**36%**	**32%**	**34%**
Fruit/vegetable (portions)	2	**14%**	**24%**	**5%**

Table 4: *Mean lunch time nutrient intake as a percentage of SNSSL target.*
Numbers in ***bold*** *indicate achievement of the SNSSL standard was not made.*
Note that the figure for energy is an 'ideal' target, rather than a maximum or minimum, as for the other nutrients.

Nutrient	SNSSL	Percentage of lunches meeting SNSSL target		
		Canteen	Packed	Street
Fat (g)	25.1	77.8	52.4	39.6
SFA (g)	7.9	63.2	40.5	53.4
NMES (g)	18.0	61.5	45.6	33.7
NSP (g)	5.2	10.5	7.4	9.4
Vitamin A (µg)	185	18.7	46.3	19.3
Folate (µg)	80	16.9	6.1	5.4
Calcium (mg)	350	21.5	21.1	14.1
Iron (mg)	5.9	0.3	0.3	0.5
Fruit/vegetable (portions)	2	3.6	5.2	0.7

Table 5: *Percentage of canteen, packed and street lunches meeting SNSSL standards.*

Nutrient (per 100 kcal/418 kJ)	Hypothetical lunch meeting SNSSL	Canteen		Packed		Street	
		MND	SD	MND	SD	MND	SD
Fat (g)	3.9	3.6*	1.5	4.5*	1.5	4.5*	1.4
SFA (g)	1.2	1.5*	0.9	2.0*	1.1	1.5*	0.8
NMES (g)	2.8	3.2*	2.9	4.4*	3.6	4.9*	3.8
NSP (g)	0.8	0.6*	0.4	0.5*	0.3	0.4*	0.4
Vitamin A (µg)	28.6	29.0	36.6	36.6*	32.6	14.1*	25.7
Folate (µg)	12.4	10.2*	5.8	7.9*	10.5	4.4*	4.8
Calcium (mg)	54.2	47.2*	27.8	38.3*	25.7	24.9*	22.6
Iron (mg)	0.9	0.4*	0.2	0.4*	1.9	0.3*	0.3
Fruit/veg (portions)	0.3	0.1*	0.2	0.1*	0.2	0.00*	0.2

Table 6: *Mean nutrient density (per 100kcal/418kJ) – Present study compared with lunch meeting SNSSL.*

*SNSSL: Scottish Nutrient Standards for School Lunches; MND: Mean Nutrient Density; SD: Standard Deviation; One sample t-test, * = $p < 0.001$.*

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