

Purchase rates and energy content of nutritionally promoted and traditional fast foods purchased at lunchtime in Australia – a pilot study

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Submitted 6 December 2010: Accepted 20 May 2011: First published online 20 July 2011

Abstract

Objective: Nutritionally promoted foods are now available at fast-food establishments. Little is known about their popularity, who is purchasing them, or their impact on dietary intake. Our study aimed to determine: how often nutritionally promoted fast foods were purchased; the demographic characteristics of people purchasing these foods; and if purchasing these foods resulted in reduced energy, and increased vegetable, content of lunches compared with those who purchased traditional fast foods.

Design: A survey collecting lunchtime fast-food purchases and demographic details was administered over two months. Nutritionally promoted products included the McDonalds' 'Heart Foundation Tick Approved' range and Subway's 'Six grams of fat or less' range. Energy and vegetable contents were estimated using information from fast-food companies' websites. Differences in demographics, energy and vegetable contents between individuals purchasing nutritionally promoted and traditional lunches were assessed using χ^2 and *t* tests.

Setting: Queensland, Australia.

Subjects: Lunchtime diners aged over 16 years at Subway and McDonalds.

Results: Surveys were collected from 927 respondents (58% male, median age 25 (range 16–84) years; 73% response rate). Only 3% (*n* 24/910) of respondents who ordered a main option had purchased a nutritionally promoted item. Purchasers of nutritionally promoted foods were ~13 years older, predominantly female (79%), and more often reported involvement in a health-related profession (29% *v.* 11%) than purchasers of traditional foods (*P* < 0.05). Purchasers of nutritionally promoted foods ordered 1.5 fewer megajoules and 0.6 more vegetable servings than purchasers of traditional foods (*P* < 0.05).

Conclusions: Nutritionally promoted fast foods may reduce lunchtime energy content, however these foods were infrequently chosen.

Keywords
Take-away
McDonalds
Subway
Vegetables

One in three Australians consumes food prepared outside the home every 24 h, with these foods contributing over one-third of total 24 h energy intake⁽¹⁾. Fast foods tend to be high in energy, and a poor source of fibre and micro-nutrients^(2–5). The significant contribution of energy-dense fast foods to the average diet has prompted concern that fast foods contribute to an obesogenic environment^(4,6–9).

Fast-food establishments may have introduced nutritionally promoted fast foods (NPF) to respond to public demand, address public concern regarding the limited health value of fast foods, or to demonstrate corporate responsibility^(10–12). NPF include the 'Tick Approved' options endorsed by the National Heart Foundation at McDonalds, and a range of sandwiches bearing a 'Six grams of fat or less' claim at Subway^(11,13).

Actual purchase rates of NPF have not been independently reported. Media articles and company reports suggest 15% of revenue from these options⁽¹⁴⁾ with 19% of customers reporting purchasing these options at McDonalds⁽¹⁵⁾. However, these purchase rates were reported soon after their introduction to menus⁽¹⁴⁾ and 'there isn't any evidence... to tell us that these healthy options have become the default'⁽¹⁶⁾. Independent research is needed to determine current purchase rates.

Previous research on who purchases NPF was not located. Females and older diners may be more likely to purchase fast foods they consider healthier^(17–19). In contrast, frequent fast-food consumers are typically younger than 40 years, male, and have poorer knowledge of the 'diet–disease relationship'^(20–22). Investigation of

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who is purchasing NPFV will provide valuable information on who accesses, and potentially benefits from, improvements to the nutrient content of fast foods.

The energy and vegetable contents of NPFV purchases have not previously been published. Purchasers of NPFV may be influenced by a 'health halo effect', which is where consumers estimate main choices promoted as 'healthy' to be lower in energy and are therefore more likely to compensate for this by purchasing additional energy-dense, nutrient-poor accompaniments with these mains⁽²³⁾; for example, more likely to purchase a cookie because a Subway sandwich with 6 g or less of fat was purchased. Research measuring the energy content of purchases made in conjunction with NPFV will identify whether purchasing these options has the potential to assist with reducing energy intake.

Independent research measuring purchase rates of NPFV is needed⁽²⁴⁾. As such, the aims of the current pilot study were to: (i) identify purchase rates of NPFV at two major fast-food chains; (ii) determine if there were differences in demographics or reasons for purchase between purchasers of NPFV and purchasers of traditional fast foods; and (iii) investigate whether purchasing NPFV resulted in reduced energy, and increased vegetable, content at lunch compared with those purchasing traditional fast foods.

Methods

Sample

Listings of Gold Coast stores for McDonalds and Subway, two of the largest fast-food retailers in Australia, were sourced from company websites^(25,26). McDonalds and Subway stores with a high frequency of dine-in traffic were targeted. Shopping centre management declined permission for surveying on their premises; therefore stores located within shopping centres were excluded. Two Brisbane store locations were visited twice due to their high number of diners at lunchtime and to expand data collection across more than one city. One of these Brisbane stores was situated within a university food court. Stores were visited on twenty-two weekdays and six weekend days. Permission to conduct surveys in-store was obtained from the on-duty manager at each visit. The Griffith University Human Research Ethics Committee approved this project prior to data collection.

Surveys were completed by customers at Subway or McDonalds who dined in-store between 11.00 and 14.00 hours and consented to participate during March and April 2010. Diners at McDonalds who purchased only McCafé items were excluded. Respondents under 16 years were subsequently excluded as they may have been influenced by family and not made independent purchase decisions. Respondents who returned surveys with incomplete lunchtime purchase information were also subsequently excluded.

Recruitment and survey collection

Researchers systematically moved through dining areas so that diners had an equal chance of being invited to participate. Eligible diners were asked if they would like to complete a short survey using a standard script.

The survey was piloted extensively prior to data collection. The survey gathered demographic information such as age, gender, involvement in a health profession, number of fellow diners and relationship with fellow diners. Respondents recorded their current lunchtime purchases on the survey as the entire menu available at the specific chain was listed. Menu information was sourced from company websites^(13,27) and in-store visits. Respondents also ticked any applicable reasons for their purchase from a list of taste, convenience, cost, health/nutritional content, favourite food, or other reason. The survey also gathered information about foods or drinks which were not purchased from the store of interest, as well as planned subsequent lunch purchases. Researchers regularly cross-checked completed surveys with observed food and drink items. Responses that were not reflective of observed purchases were excluded.

Researchers recorded the gender, age in estimated decade and number of fellow diners for each non-responder. Non-responders included those who declined participation and those who provided incorrect or incomplete lunchtime purchase information.

Classifying nutritionally promoted and traditional foods

Respondents were considered purchasers of NPFV if, regardless of other purchases, they had purchased a nutritionally promoted option, either as a main or as part of a meal. By default respondents were classified as purchasers of traditional foods if they had not purchased any nutritionally promoted mains or meals. NPFV included: the McDonalds' 'Heart Foundation Tick Approved' range which contains five meal options and two wraps; and Subway's 'Six grams of fat or less' range which includes nine sandwiches with different toppings and two 'Fresh Fit' meals. The nine Subway sandwiches meet the '6 grams of fat or less' claim only if white or wholemeal bread is ordered and cheese or high-fat sauces are not added⁽¹³⁾. Purchase rates of NPFV at Subway were therefore measured using both 'strict' and 'relaxed' criteria. When the strict criteria were applied, purchasers of NPFV were those who ordered only '6 grams of fat or less' options without cheese, high-fat sauce, and on only white or wholemeal bread. When the relaxed criteria were applied, purchasers of NPFV ordered any '6 grams of fat or less' option, regardless of the bread, cheese or sauce chosen.

All burgers, sandwiches, wraps, nuggets and full size salads (e.g. McDonalds' garden salads) were considered main choices. All sides and drinks were considered complementary choices. Side dishes included desserts, fries and side salads. Diners who purchased only sides or

drinks, without a main or a meal, were not classified as purchasers of either traditional or NPF and were excluded from further analysis.

Nutritional content of lunchtime purchases

Energy content of menu items from both chains was sourced primarily from company websites^(13,27), as well as nutrition information panels and Foodworks[®] 2007 software (Xyris Software (Australia) Pty, Highgate Hill, Australia). The survey clarified whether soft drinks ordered were standard or artificially sweetened; however, specific flavours of sides and drinks were not detailed on the surveys. The flavour containing the lowest energy content was used to analyse sides or drinks. However, due to its popularity, the energy content from standard and artificially sweetened Coca-Cola was used for all standard and artificially sweetened soft drinks purchased, respectively.

The weight (g) of standard vegetable servings at Subway was sourced from its website⁽¹³⁾. For McDonalds, the weight of salad portions in each food item was weighed individually using Homemaker digital kitchen scales (model 9757; made in China for Kmart Australia Limited) with 1 g gradation. Due to cost and time constraints, each salad portion was weighed once only. Actual weights of each vegetable were converted into a vegetable serving using Australia's food selection guide, which considered one serving of vegetables to weigh 75 g⁽²⁸⁾. Tomatoes and pickles were classified as vegetables.

Statistical analyses

Ten per cent of survey data was independently checked for data entry accuracy. All analyses were conducted using the SPSS statistical software package version 18.0 (SPSS Inc., Chicago, IL, USA). Gender, age in decades and number of fellow diners were compared between responders and non-responders using χ^2 analyses. The χ^2 test, or Fisher's exact test, was used to assess whether purchasers of NPF and purchasers of traditional items differed by gender, number of people ordering drinks or sides, number and relationship of people dining with, reasons for purchase, and involvement in a health-related profession. The independent-samples *t* test was used to assess whether differences in energy content existed between groups. The Mann-Whitney *U* test was used to assess differences between groups for age and number of vegetable servings purchased.

Results

Approximately 90% of eligible McDonalds and 37% of eligible Subway stores on the Gold Coast were approached (Fig. 1). Six store managers declined survey administration in their store. Most (4/6) cited not wanting their customers disturbed as the reason for refusal. Two-thirds (65%) of all Subway respondents were surveyed in

Brisbane. Two-fifths (39%) of all Subway respondents were surveyed on a Brisbane university campus. At the majority (83%) of stores visited, all diners present during data collection were approached.

Non-responders represented 27% of eligible diners approached (Fig. 1). Reasons for non-participation included a reported lack of time, not being interested and language barriers. Ninety-eight respondents were excluded as they were aged <16 years.

The majority (86%) of responders were aged between 16 and 49 years, with a median age of 25 years (range 16–84 years). Older adults (>50 years) were less likely to participate, and people aged 16–29 years were more likely to participate ($P < 0.05$). The proportion of males was similar between non-respondents (55%) and respondents (58%). Subway diners were 12 years younger than McDonalds' diners ($P < 0.05$). Median age at each chain remained different even when the Subway university sample was removed ($P < 0.05$).

Three-quarters (75%) of respondents were dining with others (Table 1). McDonalds' respondents were more likely to be dining with two or more others and less likely to be dining alone than the Subway sample ($P < 0.05$). Removing the Subway university sample did not alter the differences in the proportions of fellow diners found between chains. One-quarter (27%) of participants reported dining with family and were older (median 37 (range 16–78) years) than those not dining with family (median 23 (range 16–84) years, $P < 0.05$). Subway participants were also less likely to be dining with family (14% with family) than participants at McDonalds (41%; $P < 0.05$). A greater proportion of purchasers of NPF were dining with family (50%) than purchasers of traditional foods (26%; $P < 0.05$).

Eleven per cent of respondents worked or trained in a health-related profession, with a similar proportion dining in at both stores (Table 1). Only 6% of respondents reported consuming foods or beverages not purchased from Subway or McDonalds. These were most commonly drinks and confectionery. Another 7% of respondents planned to purchase additional foods or drinks following their current meal. Only three of these respondents had also purchased NPF.

Most respondents aged 16 years or older (98%, n 910/927, Subway (S) = 483, McDonald's (M) = 427) had purchased a main or a main as part of a meal deal (Table 2). Only 3% (n 24/910) of these respondents had purchased NPF. When the relaxed criteria were used to classify purchasers of NPF at Subway, 40% (n 193/483) of Subway diners and 23% of the entire sample (n 210/910) had purchased NPF. Only one respondent aged <16 years had ordered NPF using strict criteria (1%, n 1/98), and seven had ordered NPF using the relaxed criteria (7%, n 7/98).

Purchasers of NPF were a median of 13 years older (age 38 (range 18–63) years) than purchasers of

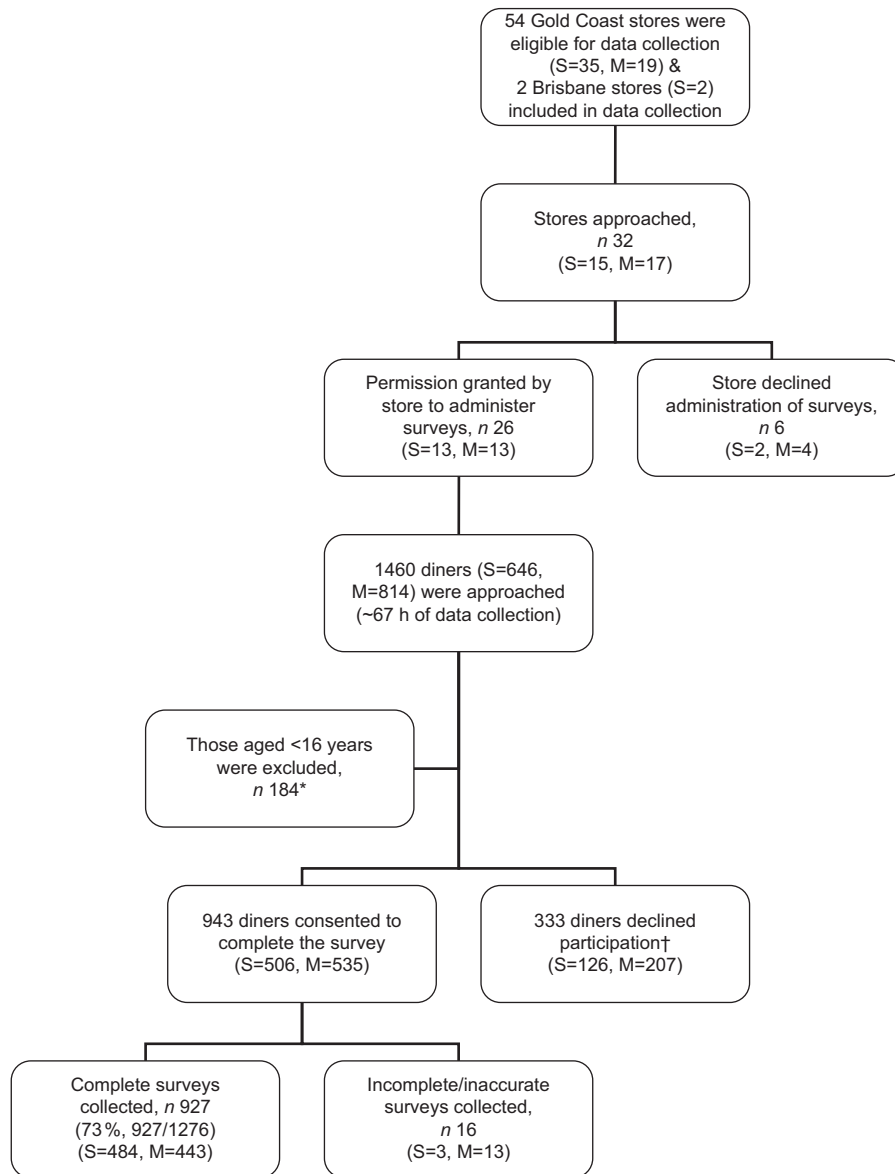


Fig. 1 Flowchart of the data collection process (S, Subway; M, McDonalds). *Ninety-eight respondents aged <16 years were excluded and eighty-six people aged <10 years who were ineligible to participate as parent/guardian did not provide consent or declined their participation were also excluded; †this figure includes ineligible participants (children aged 10–15 years whose parents were not available to provide consent or did not provide consent) – the age of non-responders and ineligible participants was recorded by decade (e.g. 10–19 years) and non-responders were not distinguished from ineligible participants during data collection

traditional foods (age 25 (range 16–84) years; $P < 0.05$) and 79% were female ($P < 0.05$; Table 2). Purchasers of NPFFF were less likely to dine alone ($P < 0.05$) and more frequently reported having worked or trained in a health profession (29%) than purchasers of traditional foods (11%; $P < 0.05$). Significantly more purchasers of NPFFF (46% *v.* 18%) cited health or nutritional content as a reason for their purchase ($P = 0.002$). While more purchasers of NPFFF at McDonalds (53%) cited health or nutritional content as reasons for purchase than those purchasing traditional foods (5%, $P = 0.000$), no differences were observed at Subway when the Subway strict

criteria were applied (29% *v.* 29%, $P > 0.05$). However, more Subway purchasers of NPFFF cited health or nutritional content as reasons for purchase when the relaxed criteria were applied (38%) than purchasers of traditional foods (22%) ($P = 0.000$). The proportion of respondents who reported taste, convenience, cost or favourite food as reason for purchase was similar between groups ($P > 0.05$).

Purchasers of NPFFF ordered on average 1.5 fewer megajoules than purchasers of traditional foods ($P < 0.05$; Table 3). Purchasers of NPFFF ordered lower-energy mains and complementary choices (1.5 MJ and 0.6 MJ, respectively)

Table 1 Demographic characteristics of respondents aged 16 years or older by total sample and store: lunchtime diners at Subway and McDonalds, Queensland, Australia

Characteristic	Total sample (n 927)	Total McDonalds sample (n 443)	Total Subway sample (n 484)	Subway university sample (n 188)	Subway non-university sample (n 296)
	%	%	%	%	%
Gender, male	58.1	53.7 ^a	62.2 ^a	67.6	58.8
Health-related training	11.1	9.5	13.2	13.7	13.0
No. of fellow diners					
0 (dining alone)	24.9	19.8 ^{a,f}	29.9 ^a	27.4	31.5 ^f
1	38.1	35.9 ^e	40.5	28.0 ^c	48.5 ^{c,e}
≥2	36.4	44.3 ^{b,g}	29.5 ^b	44.6 ^d	20.0 ^{d,g}

Not all demographics were completed by all respondents: health profession (n 899), no. of fellow diners (n 921), gender (n 927).
^{a,b,c,d,e,f,g}Identical superscript letters within the same characteristic indicate significant differences between groups (P < 0.05).

Table 2 Descriptive characteristics of purchasers of nutritionally promoted and traditional fast foods aged 16 years and older by total sample and store: lunchtime diners at Subway and McDonalds, Queensland, Australia

Characteristic	Traditional total (n 886)	NPFF total (n 24)	McDonalds traditional (n 410)	McDonalds NPFF (n 17)	Subway traditional (strict criteria) (n 476)	Subway NPFF (strict criteria) (n 7)	Subway traditional (relaxed criteria) (n 290)	Subway NPFF (relaxed criteria) (n 193)
	%	%	%	%	%	%	%	%
Gender, male	59.5 ^a	20.8 ^a	55.9 ^b	11.8 ^b	62.6	42.9	71.4 ^c	48.7 ^c
Health-related training	11.1 ^a	29.2 ^a	8.8 ^b	35.3 ^b	13.0	14.3	11.4	15.5
No. of fellow diners								
0 (dining alone)	25.7 ^a	4.2 ^a	20.4	0.0 [*]	30.2	14.3 [*]	33.0	25.5
1	38.0 ^b	54.2 ^b	35.6	47.1	40.0	71.4	36.1	46.9
≥2	36.4	41.7	44.0	52.9	29.8	14.3	30.9	27.6
Purchased sides	48.2	45.8	80.5 ^a	47.1 ^a	20.4	42.9	22.1	18.7
Purchased drinks	70.8	79.2	92.4 ^a	76.5 ^a	52.1	85.7	53.8	50.8

NPFF, nutritionally promoted fast food.
 Not all demographics were completed by all respondents: health profession (n 882), no. of fellow diners (n 904), gender (n 910); only those who purchased mains were able to be classified as purchasers of nutritionally promoted or traditional fast foods (n 910).
^{a,b,c}Identical superscript letters within the same characteristic indicate significant differences between groups (P < 0.05).
^{*}Statistical analysis was not performed as the χ^2 test criterion of all cells having expected counts of >5 was not met.

than those purchasing traditional foods (2.5 MJ and 1.2 MJ, respectively; P < 0.05). While there were no differences in the proportion ordering sides in each group overall (Table 2), significantly fewer purchasers of NPFF ordered sides at McDonalds. Purchasers of NPFF also ordered sides containing 0.4 fewer megajoules than purchasers of traditional foods (P < 0.05; Table 3). Further only 30% ordered a side of fries compared with 80% of purchasers of traditional foods at McDonalds (P < 0.05).

Average energy content of drinks purchased and the proportion purchasing drinks were similar between groups overall (Tables 2 and 3). However, more purchasers of NPFF at McDonalds did not order a drink (23%) than purchasers of traditional foods (8%; P < 0.05). This may have resulted in purchasers of NPFF at McDonalds ordering fewer megajoules from drinks (0.3 MJ) than purchasers of traditional foods (0.6 MJ, P < 0.05).

Purchasers of NPFF ordered more (0.6 servings, ~ 45 g) vegetables than purchasers of traditional foods (P < 0.05; Table 3). Purchasers of NPFF at McDonalds ordered foods containing one more vegetable serving (75 g) than purchasers of traditional foods. The vegetable

content of lunches did not differ between purchasers of nutritionally promoted or traditional fast foods at Subway when both the strict and relaxed criteria were applied. However, Subway diners ordered more vegetable servings (1.4 (range 0–4.4)) than McDonalds' diners (0.2 (range 0–1.6)); P = 0.000).

Discussion

Fewer than three NPFF were purchased for every 100 traditional mains purchased. No previous studies have independently investigated NPFF purchase rates; however, our purchase rates appear lower than company and media reports. An Australian newspaper reported in 2008 that approximately 15% of sales at McDonalds were from NPFF⁽¹⁴⁾. The National Heart Foundation⁽¹⁵⁾ reported in 2007, the year McDonalds introduced its nutritionally promoted meals in Australia, that 19% of McDonalds' customers reported changing their order from a traditional to a nutritionally promoted meal. Also, another 29% of customers intended to purchase the nutritionally

Table 3 Energy and vegetable contents of nutritionally promoted and traditional fast foods purchased by those aged 16 years and older by total sample and store: lunchtime diners at Subway and McDonalds, Queensland, Australia

Content	Traditional total (n 886)		NPFFF total (n 24)		McDonalds traditional (n 410)		McDonalds NPFFF (n 17)		Subway traditional (strict criteria) (n 476)		Subway NPFFF (strict criteria) (n 7)		Subway traditional (relaxed criteria) (n 290)		Subway NPFFF (relaxed criteria) (n 193)	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Total energy (MJ)	3.7 ^a	3.6, 3.8	2.2 ^a	1.8, 2.5	4.0 ^b	3.8, 4.1	2.1 ^b	1.7, 2.5	3.5 ^c	3.4, 3.7	2.3 ^c	1.5, 3.2	3.8 ^d	3.7, 4.0	3.0 ^d	2.8, 3.2
Main (MJ)	2.5 ^a	2.5, 2.6	1.5 ^a	1.4, 1.7	2.2 ^b	2.1, 2.2	1.5 ^b	1.3, 1.6	2.9 ^c	2.8, 3.0	1.7 ^c	1.0, 2.3	3.1 ^d	3.0, 3.3	2.4 ^d	2.3, 2.6
Comp choices (MJ)	1.2 ^a	1.1, 1.3	0.6 ^a	0.3, 0.9	1.8 ^b	1.7, 1.9	0.6 ^b	0.2, 1.0	0.7	0.6, 0.7	0.7	0.1, 1.2	0.7	0.6, 0.8	0.6	0.5, 0.7
Sides (MJ)	0.7 ^a	0.7, 0.8	0.3 ^a	0.1, 0.5	1.3 ^b	1.2, 1.3	0.3 ^b	0.1, 0.6	0.3	0.2, 0.3	0.3	0, 0.6	0.3	0.2, 0.4	0.2	0.2, 0.3
Drinks (MJ)	0.5	0.4, 0.5	0.3	0.2, 0.5	0.6 ^b	0.5, 0.6	0.3 ^b	0.1, 0.4	0.4	0.3, 0.4	0.4	0, 0.9	0.4	0.3, 0.5	0.3	0.3, 0.4
Vegetable servings*	0.6 ^a	0, 4.4	1.2 ^a	1.0, 3.9	0.2 ^{b,c}	0, 1.3	1.2 ^b	1, 1.6	1.4	0, 4.4	1.6 ^c	1.0, 3.9	1.4	0, 4.2	1.4	0, 4.4

Comp, complementary; NPFFF, nutritionally promoted fast food. Only those who purchased mains were able to be classified as purchasers of nutritionally promoted or traditional fast foods (n 910). a,b,c,d, identical superscript letters within the same characteristic indicate significant differences between groups (P < 0.05). *Results expressed as median (range).

promoted option but actually purchased a traditional meal⁽¹⁵⁾. These discrepancies may be attributable to a decline in media promotion of these products since their introduction, differences in methods used to calculate purchase rates of NPFFF, or a change in the NPFFF offered. The options available in the Tick range have decreased from nine to seven items since 2007^(11,29), and only one of the four nutritionally promoted options evaluated by Brindal *et al.*⁽²⁾ that were available at fast food stores in Australia in 2005 are still offered in 2010. However, our findings agreed with American media. In 2005, *USA Today* reported that American Pizza Hut sold roughly one lower-energy Fit N' Delicious pizza for every 100 pan pizzas sold and that Burger King reported 100 whoppers were sold for every single veggie burger sold⁽³⁰⁾. Despite reports of their unpopularity, NPFFF continue to appear on fast food menus in Australia. Despite requesting healthier options, consumers may not choose these when made available⁽³¹⁾.

Purchasers of NPFFF were more likely to be older, female, trained in a health profession, dining with others and to cite health or nutritional content as reasons for purchasing their lunches when compared with those who made traditional purchases. Rydell *et al.*⁽¹⁹⁾ found that those aged 15–24 years were less likely to choose fast-food options they considered nutritious compared with those aged 55 years or older. Women have previously been more likely to self-report choosing fast-food options that they considered to be healthier⁽¹⁷⁾, and may eat fast foods because family and/or friends like it⁽¹⁹⁾. The demographic differences found in the present study were not always significant within each chain. This may be due to the small sample of purchasers of NPFFF (M: n 17; S: n 7).

Purchasers of NPFFF displayed similar characteristics to those who consumed fast foods less frequently. The median age of purchasers of NPFFF in our sample was 38 (range 18–63) years. Those aged 35–45 years and above have previously been observed to consume fast food less frequently^(20,32). Purchasers of NPFFF were predominantly female and some studies have reported males consume fast foods more frequently than females^(17,18,21,33). Purchasers of NPFFF in our sample more often reported working or training in a health-related field, and Mohr *et al.*⁽²⁰⁾ found that individuals with a greater knowledge of the diet–disease relationship consume fast foods less frequently. If purchasers of NPFFF represent a group who consume fast foods less frequently, this would explain why purchase rates were low.

Purchasers of NPFFF ordered lunches containing on average 1.5 fewer megajoules than purchasers of traditional fast foods. The only previous study to investigate energy differences between nutritionally promoted and traditional fast foods did not explore purchasing patterns but found that NPFFF available on fast-food menus contained 2 MJ less than traditional meal options that were also available⁽²⁾. Our study showed that a significant reduction in lunchtime energy content occurs when NPFFF are purchased.

A health halo effect was not evident during the lunchtime purchase of NPPF. Purchasers of NPPF ordered lunches with fewer megajoules and a similar number of sides and drinks as purchasers of traditional foods, with fewer purchasers of NPPF ordering sides and drinks at McDonalds. Chandon and Wansink⁽²³⁾ reported that fast-food consumers who perceived that they were ordering a healthier option were more likely to order sides and complementary choices resulting in orders with higher total energy. However, these results were based on a small university sample ($n < 50$) in a simulated purchase situation⁽²³⁾. Although no health halo effect was evident at lunchtime in our study, a health halo effect may occur over a longer time period, for example an entire day. Further research is needed to determine whether a nutritionally promoted lunch purchase leads to an overall reduction in daily energy intake.

Purchasers of NPPF ordered 0.6 more vegetable servings than purchasers of traditional foods, primarily due to the inclusion of more vegetables within the nutritionally promoted mains at McDonalds. Subway diners also purchased significantly more vegetables than McDonalds' diners. Providing the option to include vegetables in every fast-food main sold may result in increased vegetable purchases. This may be a useful strategy as those who consume fast foods more frequently tend to have lower vegetable intakes than irregular fast-food consumers^(3,21,34).

The present study has several strengths. Data were collected from respondents after the point of purchase, which likely reduced any influence the study may have had on respondents' purchasing behaviour. Data collected just after purchase also eliminated recall bias and reflects actual behaviours, whereas investigations of purchase intentions may not^(15,23). Data collected immediately after the point of purchase also enabled researchers to clarify responses and cross-check responses against observed purchases, thus improving the validity of the instrument. Further, the store acceptance and respondent response rates were high (81% and 73%, respectively).

The study collected data on foods and drinks purchased. While respondents were instructed prior to survey completion to report only foods purchased for their own consumption, reported purchases may not accurately reflect consumption. Males may be more likely to consume a larger percentage of fast foods purchased than females⁽¹⁷⁾ and therefore purchasers of NPPF, who were predominantly female, may consume less of their purchases. The difference in lunchtime energy content between purchasers of traditional and NPPF observed in our study may therefore be conservative in terms of consumption. Underestimation of lunchtime energy intake was unlikely to occur as a result of additional purchases though, as only 6% of respondents reported consuming foods or drinks in addition to those purchased from Subway or McDonalds, and only 7% reported planning to purchase further items at lunchtime. Additionally, only

three respondents who had reported planned or additional purchases had also purchased NPPF.

Another limitation of the present study was that only dine-in customers were surveyed and their purchases may not represent all fast-food purchasers. Mohr observed that eat-in diners were more likely to be under 45 years of age and unconcerned about health, which could in part explain our low purchase rates of NPPF⁽²⁰⁾. However, a New York study that collected purchase receipts from dine-in and take-away fast-food customers reported average energy intakes ($S = 3.1$ MJ; $M = 3.5$ MJ)⁽²⁴⁾ that were comparable to the majority of respondents in our study ($S = 3.5$ MJ; $M = 4.0$ MJ). While more than half (56%, 30/54) of the standalone stores in the Gold Coast region were visited, the survey was administered only at Gold Coast and Brisbane locations and stores were not randomly selected. This may limit the generalizability of findings to the wider population, particularly given the high proportion of university students sampled for Subway. However regular fast-food consumers are often younger⁽²⁰⁾, and university students therefore fit this demographic. Further research on fast-food purchasing patterns in rural areas may also be warranted. Another study limitation was that the majority of the nutrient information was sourced directly from fast-food companies' websites. As independent sources were not used, this reduces confidence in the accuracy of the nutrient information. The impact of fellow diners on food purchasing behaviour was also not investigated. Family members may impact upon purchasing behaviours as families may be more likely to purchase similar foods. However the impact of family presence may be reduced because respondents aged <16 years, a group who may be more likely to visit fast-food restaurants with family, were excluded from the analysis.

Overall, the purchase rate of NPPF observed in the present study was low but, when purchased, led to reductions in energy and improvements in vegetable content at lunchtime compared with those who made traditional purchases. Those who purchased NPPF shared similar demographics to irregular fast-food consumers, a potential explanation for the low purchase rates of these foods. To further elucidate purchasing behaviours displayed by those who choose NPPF, future studies could measure purchase rates of NPPF at other meal times and in the wider population, examine how to improve the purchase rates of NPPF among regular fast-food consumers, investigate whether NPPF purchases translate to a decrease in total daily energy intake, and confirm whether vegetable intakes improve among fast-food consumers if included as an option or in larger quantities in every main meal choice.

Acknowledgements

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sector. The authors have no conflicts of interest. Both authors were

responsible for study design, data analysis, manuscript drafting, and L.F.A. was responsible for data collection. The authors would also like to thank Louise Lombard for her assistance with data collection and data entry checking.

References

- Burns C, Jackson M, Gibbons C *et al.* (2002) Foods prepared outside the home: association with selected nutrients and body mass index in adult Australians. *Public Health Nutr* **5**, 441–448.
- Brindal E, Mohr P, Wilson C *et al.* (2008) Obesity and the effects of choice at a fast food restaurant. *Obes Res Clin Pract* **2**, 111–117.
- French SA, Harnack L & Jeffery RW (2000) Fast food restaurant use among women in the Pound of Prevention study: dietary, behavioural and demographic correlates. *Int J Obes Relat Metab Disord* **24**, 1353–1359.
- Prentice AM & Jebb SA (2003) Fast foods, energy density and obesity: a possible mechanistic link. *Obes Rev* **4**, 187–194.
- Pereira MA, Kartashov AI, Ebbeling CB *et al.* (2005) Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. *Lancet* **365**, 36–42.
- Harnack L & French S (2003) Fattening up on fast food. *J Am Diet Assoc* **103**, 1296–1297.
- Medew J (2009) Food labels to tackle obesity. *The Age*, 15 January, p. 3.
- Spurlock M (2004) *Super Size Me* (DVD). USA: Samuel Goldwyn Films/Roadshow Attractions.
- Rosenheck R (2008) Fast food consumption and increased caloric intake: a systematic review of a trajectory towards weight gain and obesity risk. *Obes Rev* **9**, 535–547.
- Subway Restaurants (2010) Healthier Living. http://www.subway.com.au/info/healthier_living/ (accessed April 2010).
- McDonalds Australia (2010) Tick approved – make a healthier choice. <http://mcdonalds.com.au/our-food/tick-approved> (accessed May 2010).
- Glanz K, Resnicow K, Seymour J *et al.* (2007) How major restaurant chains plan their menus: the role of profit, demand and health. *Am J Prev Med* **32**, 383–388.
- Subway Restaurants (2010) Nutritional Information. http://www.subway.com.au/info/our_menu/nutritional_information/ (accessed April 2010).
- Chapman S (2008) A tick for Macca's, but is your ticker the winner? *Sydney Morning Herald*, 5 February, p. 11.
- National Heart Foundation of Australia (2010) Tick FAQs. <http://www.heartfoundation.org.au/sites/tick/consumers/Pages/FAQ's.aspx> (accessed June 2010).
- Douglas J (2009) Top of the Food Chain McDonald's Australia has led the way for the global fast-food chain's evolution from pariah to purveyor of healthy goods – although some are still to be convinced. *Bus Rev Wkly* **30**, issue 13, 28–29.
- Driskell JA, Meckna BR & Scales NE (2006) Differences exist in the eating habits of university men and women at fast-food restaurants. *Nutr Res* **26**, 524–530.
- Morse KL & Driskell JA (2009) Observed sex differences in fast-food consumption and nutrition self-assessments and beliefs of college students. *Nutr Res* **29**, 173–179.
- Rydell SA, Harnack IJ, Oakes JM *et al.* (2008) Why eat at fast-food restaurants: reported reasons among frequent consumers. *J Am Diet Assoc* **108**, 2066–2070.
- Mohr P, Wilson C, Dunn K *et al.* (2007) Personal and lifestyle characteristics predictive of the consumption of fast foods in Australia. *Public Health Nutr* **10**, 1456–1463.
- Paeratakul S, Ferdinand DP, Champagne CM *et al.* (2003) Fast-food consumption among US adults and children: dietary and nutrient intake profile. *J Am Diet Assoc* **103**, 1332–1338.
- Dunn KI, Mohr PB, Wilson CJ *et al.* (2008) Beliefs about fast food in Australia: a qualitative analysis. *Appetite* **51**, 331–334.
- Chandon P & Wansink B (2007) The biasing health halos of fast-food restaurant health claims: lower calorie estimates and higher side-dish consumption intentions. *J Consum Res* **34**, 301–314.
- Dumanovsky T, Nonas CA, Huang CY *et al.* (2009) What people buy from fast-food restaurants: caloric content and menu item selection, New York City 2007. *Obesity (Silver Spring)* **17**, 1369–1374.
- Subway Restaurants (2010) Restaurant Locator. http://www.subway.com.au/store_locator (accessed April 2010).
- McDonalds Australia (2010) Restaurant Locator. <http://mcdonalds.com.au/find-us/restaurant> (accessed May 2010).
- McDonalds Australia (2010) Nutrition. <http://mcdonalds.com.au/our-food/nutrition> (accessed May 2010).
- Australian Government Department of Health and Ageing (1998) *Australian Guide to Healthy Eating*. Canberra: Commonwealth of Australia.
- National Heart Foundation of Australia (2007) McDonald's Australia earns Heart Foundation tick on 9 meals. <http://www.heartfoundation.org.au/SiteCollectionDocuments/Tick%20Media%20Release%20Foodservice%202007-02-05b.pdf> (accessed February 2010).
- Horovitz B (2005) Restaurant sales climb with bad-for-you food. *USA Today*, 13 May, p. A.1; available at http://www.usatoday.com/money/industries/food/2005-05-12-bad-food-cover_x.htm
- Keohane J (2008) Fat Profits. <http://www.entrepreneur.com/growyourbusiness/portfoliocombusinessnewsandopinion/article189704.html> (accessed May 2010).
- Blanck HM, Yaroch AM, Atienza AA *et al.* (2007) Factors influencing lunchtime food choices among working americans. *Health Educ Behav* **36**, 289–301.
- Glanz K, Basil M, Maibach E *et al.* (1998) Why Americans eat what they do: taste, nutrition, cost, convenience and weight control concerns as influences on food consumption. *J Am Diet Assoc* **98**, 1118–1126.
- Bowman SA, Gortmaker SL, Ebbeling CB *et al.* (2004) Effects of fast-food consumption on energy intake and diet quality among children in a national household survey. *Pediatrics* **113**, 112–118.